TEXTILE MANUFACTURER

MATERIALS • PROCESSES • PRODUCTION • MANAGEMENT

Monthly: Two Shillings and Sixpence ESTABLISHED 1875 NOVEMBER 1958

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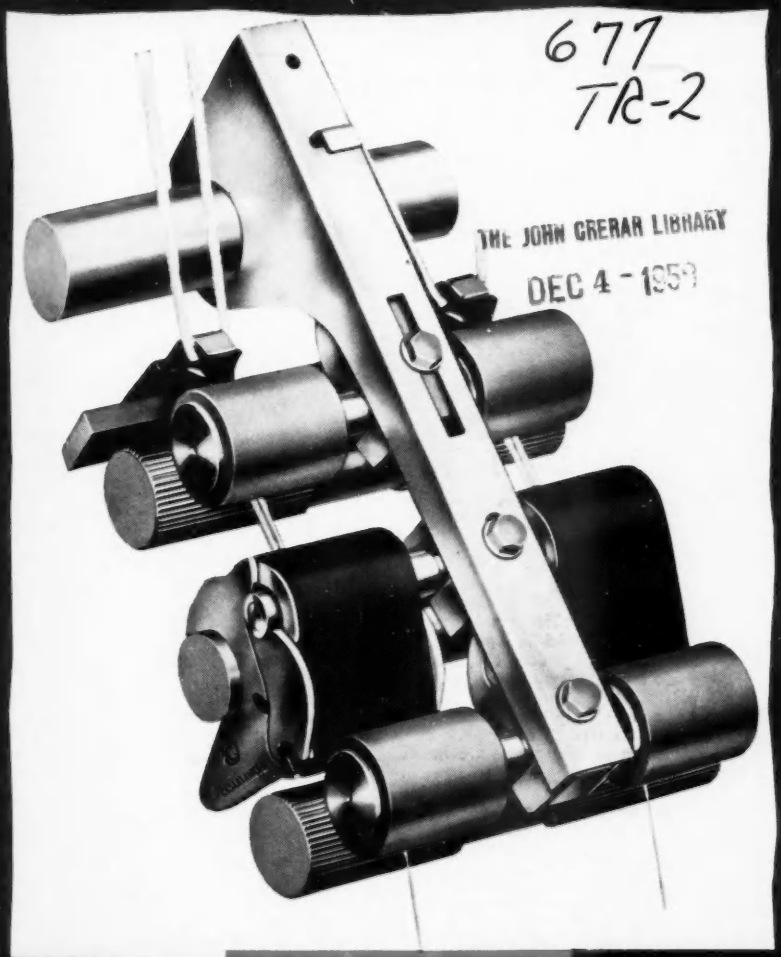

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the best principles
the newest ideas

CASABLANCAS HIGH DRAFT CO. LTD.
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A typical installation of Westmorland Doublers producing Carpet Backing Yarns

The Westmorland
DOUBLER

for

Carpet Yarns
ON CONE OR CHEESE

The Westmorland Doubler can be adapted to process Tufted Carpet Yarns, Carpet Backing Yarns, Candlewick Tufting Yarns, etc., being fed by multiple end wound packages normally 8″ × 8″ on 1½″ bore tubes, but a 10″ traverse × 8″ diameter package can be applied if desired.

This means a completely knotless package can be doffed in cone or cheese form, ready for the tufting machine or other process. Maximum cone diameter 10″. Two turns for every revolution of the spindle are inserted, giving extremely high production, viz.: 3 fold 3s counts, inserting 3 T.P.I.

Approximate production per 44 hours from 36 spindle machine — 6,000 lbs. Woollen yarns and mixtures can be successfully processed on the Westmorland Doubler. We shall be pleased to run sample packages on request.

DODD
TEXTILE MACHINERY

The Westmorland Doubler is manufactured under agreement by

S. DODD & SONS LTD.
LYON WORKS OLDHAM

Telephone: MAln (Oldham) 3617

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But cats are liable to get fat and lazy, whereas our modern, scientific pest destruction Service is always alert, and it deals with all rodent and insect pests. If your premises are infested by rats, mice, cockroaches, ants, fleas, crickets or bugs, call us in—we shall not go to sleep on the job.

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BBC

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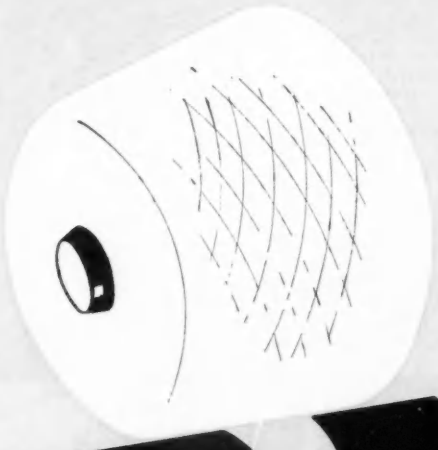
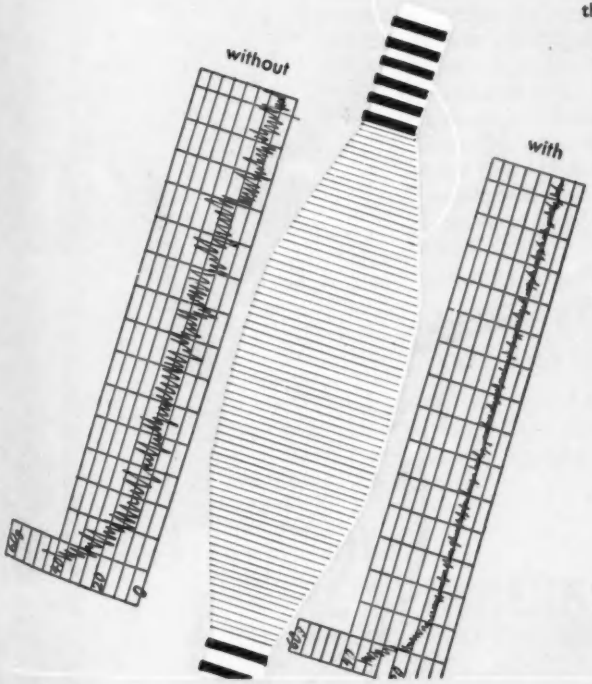
CONE WINDER



BKN

with
UNWINDING ACCELERATOR

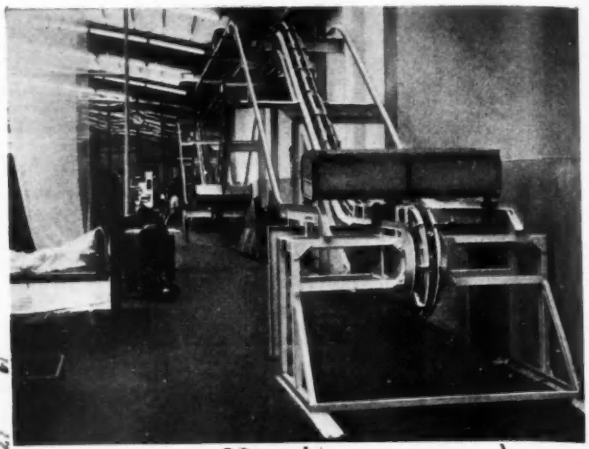
This tried and proved Cone Winder can wind up to 1600 yds./min. Quick winding requires just as quick unwinding from the yarn package. Most spinning bobbins do not allow such high winding speeds. Frequent thread breakages and sloughing off of several yarn layers set a limit to the winding speed attainable in practice. Improvements can be reached by special kinds of cop-build, but this would mean a draw-back to the spinning plant. With the new Unwinding Accelerator (patents applied for) Schlafhorst has solved the problem in the Cone Winder itself. Completely new unwinding conditions are the result. By the kinetic energy of the balloon the thread swings easily and with little tension off the yarn package. Therefore unwinding will be much quicker before you get the same yarn tension and number of thread breakages as in the case of unfavourable unwinding conditions. Increases up to 50% have been obtained. With the Unwinding Accelerator the high productive capacity of the machine is fully utilized.



Schlafhorst

W. SCHLAFHORST & CO., M. GLADBACH · GERMANY

Teleflex conveyor system installed at Hollands-Zwitersche Borduurfabriek Egger N.V. Almelo. The system comprises a Universal Overhead Conveyor for the transport of cotton goods with automatic discharge.



A comparison between old and new methods. Installation by Teleflex N.V., Rotterdam.

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The textile industry is another instance of where Teleflex handling systems are speeding production and reducing costs. Teleflex Mechanical Handling Engineers are called upon to provide many different handling systems — in their hands the problems of improved flow pattern and reduced handling costs find their ideal solution.

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The above list gives but a few of the end-uses now possible from ORLON yarns. Dyed yarns and the availability of yarns from a wider range of Deniers have launched ORLON into entirely new markets.

Orlon is the registered trademark of E.I. Du Pont de Nemours & Company Inc.

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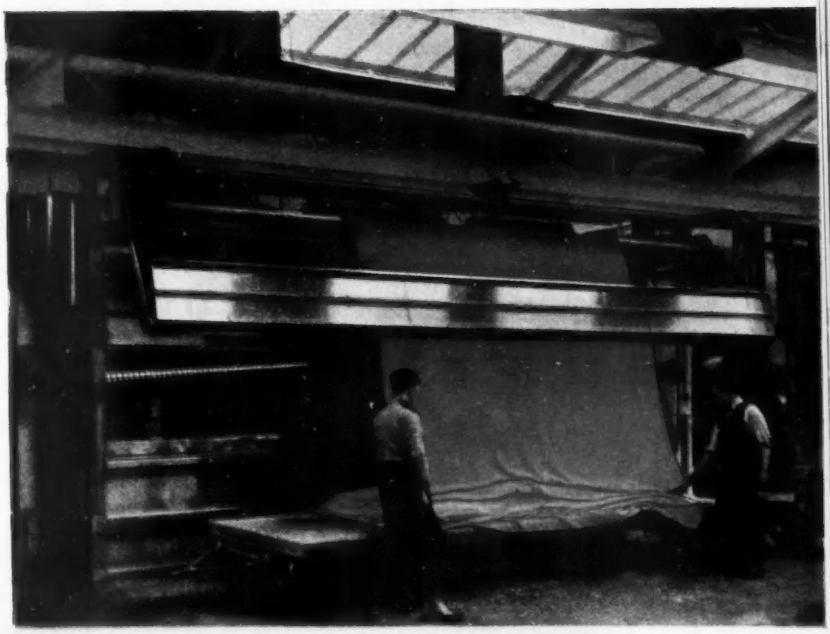
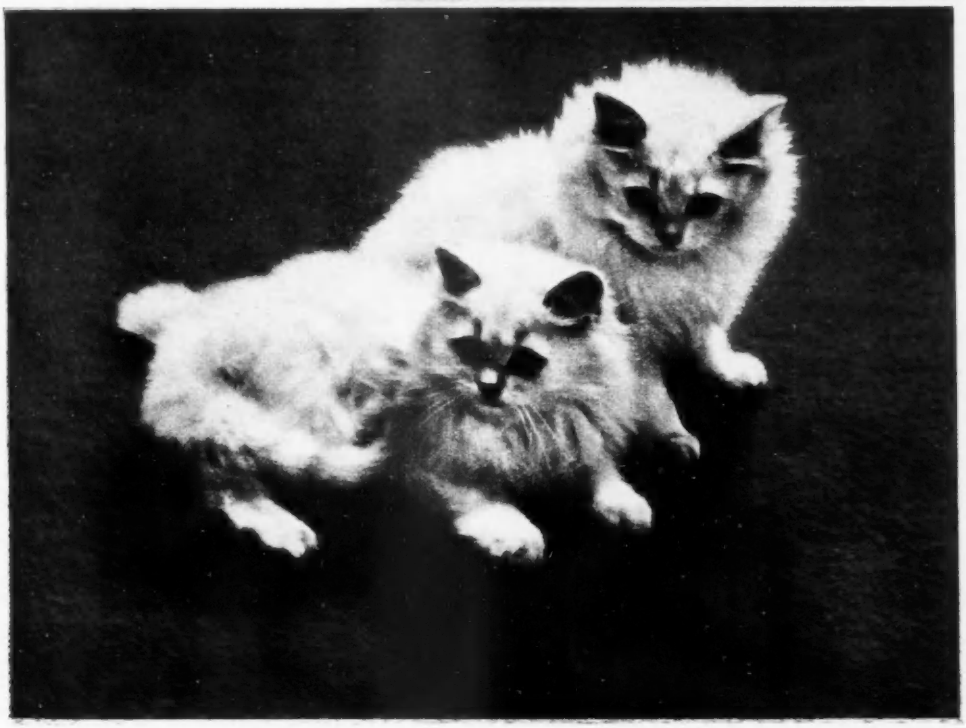
behind the scenes . . .





With acknowledgments to Kosset Carpets Limited, Brighouse.

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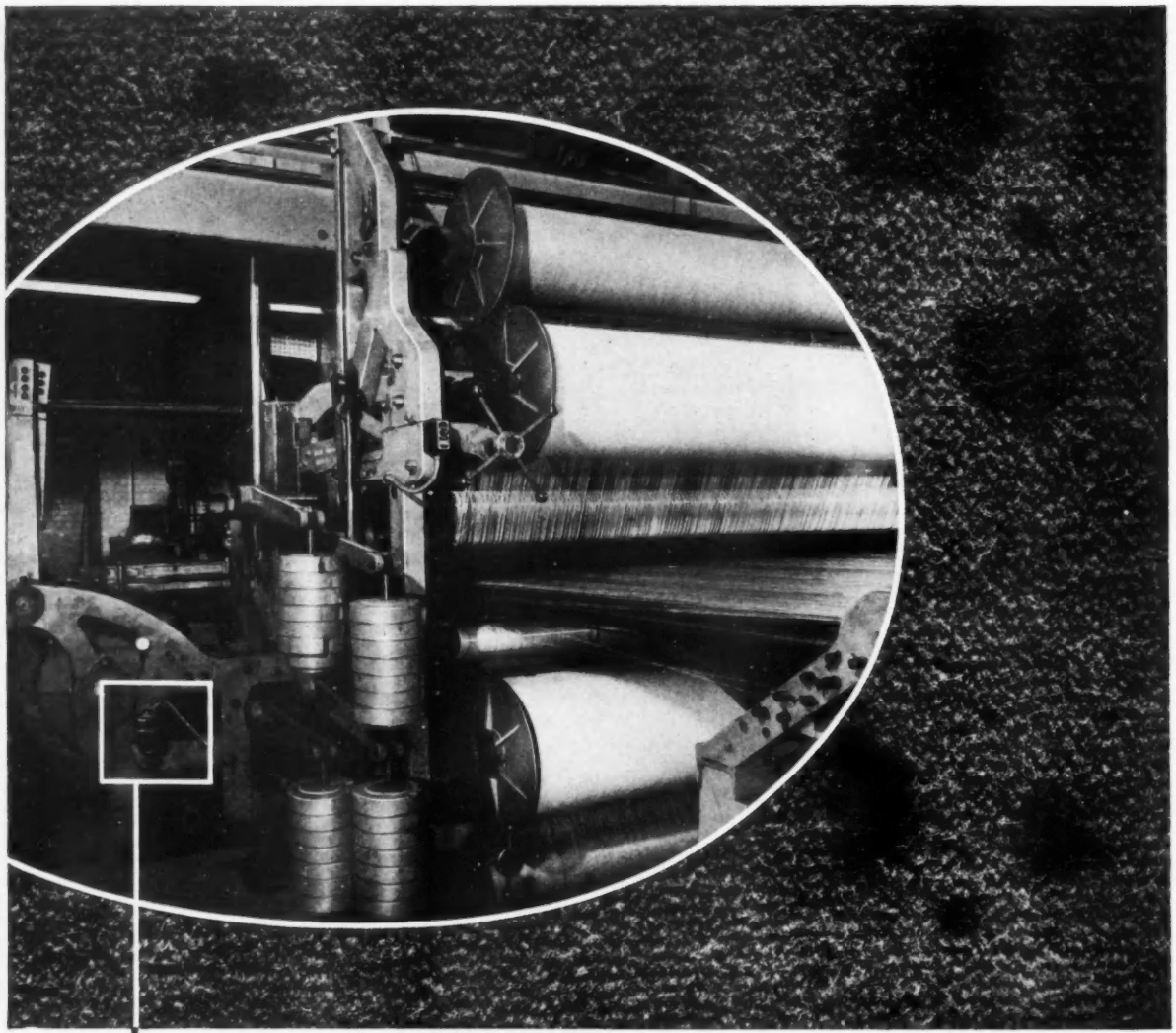

At the works of Messrs. Wilson & Longbottom of Barnsley, this loom weaves Wilton Carpets on the Face-to-Face principle, the pile yarn being cut to separate them. The loom is fitted with a Tecalemit "Bijur" semi-automatic Lubricating System.

NO CHANCE OF OIL SPOTTING

WITH TECALEMIT AUTOMATIC LUBRICATION

Tecalemit Automatic Lubrication has now replaced old-fashioned, messy, oiling methods on many textile machines. On this intricate carpet loom there are 75 oiling points to which oil is metered cleanly and efficiently, by the Tecalemit "Bijur" System. Each point receives at regulated intervals the exact quantity of oil needed.

Every bearing and friction point is maintained at its full efficiency, unproductive stoppages for hand lubrication are unnecessary, and spoilage of valuable carpeting by oil spotting is avoided.

The "Bijur" System — one of several Tecalemit Systems — may be entirely automatic or controlled by a single hand pump. It is particularly suitable for many types of textile machinery.

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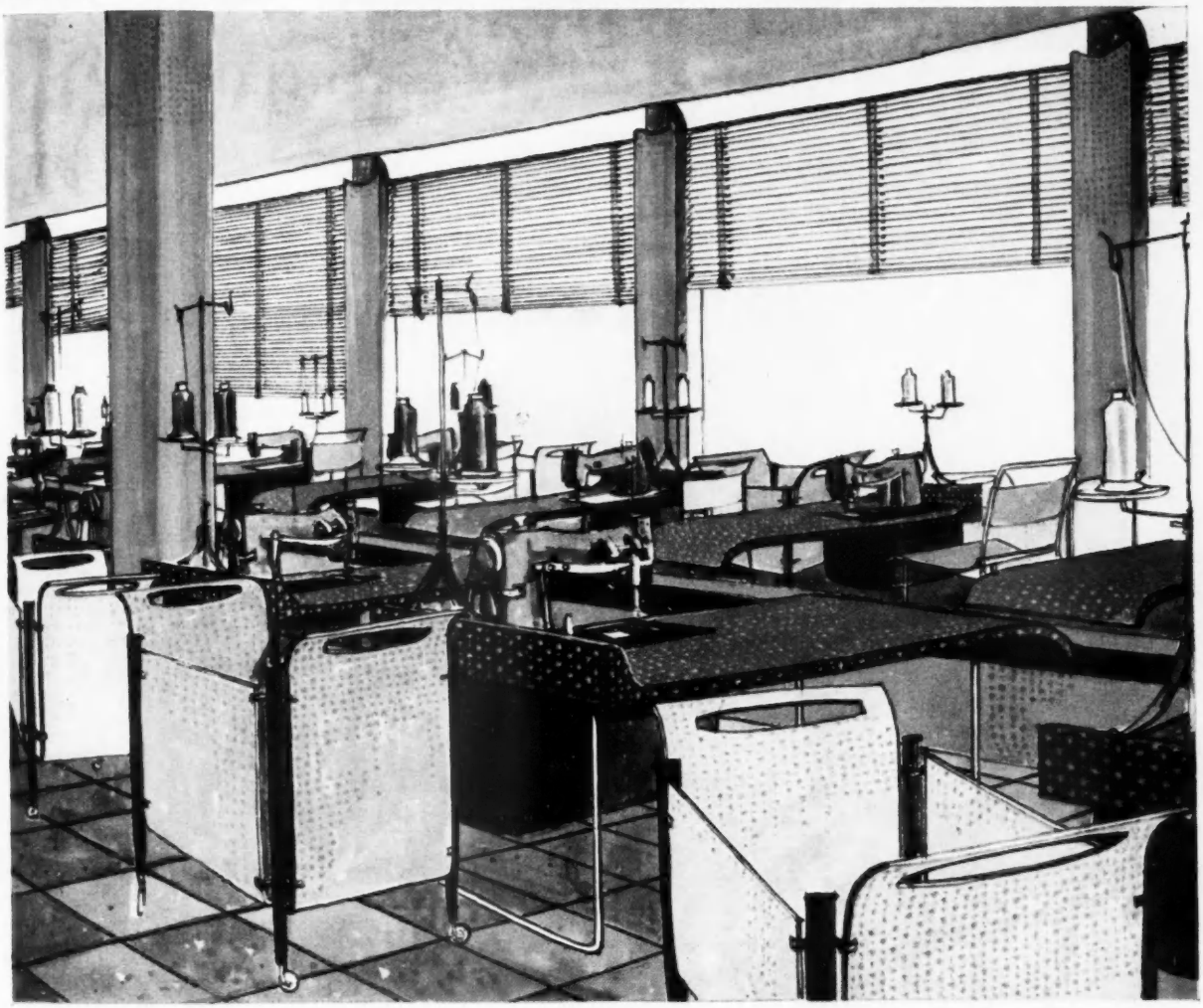

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Look at the picture above. You will get an idea of some of the possibilities if you refer to our picture. The qualities of FORMICA laminates generally—their hardness, smoothness, cleanness and ease of cleaning—are by now well known. The curvature of FORMICA surfaces lends, at the same time, new grace and new efficiency to design. Details of equipment or broad architectural features can all benefit. Pillars can be clad in any shape required. Wall panelling can be neatly rounded at corners . . .

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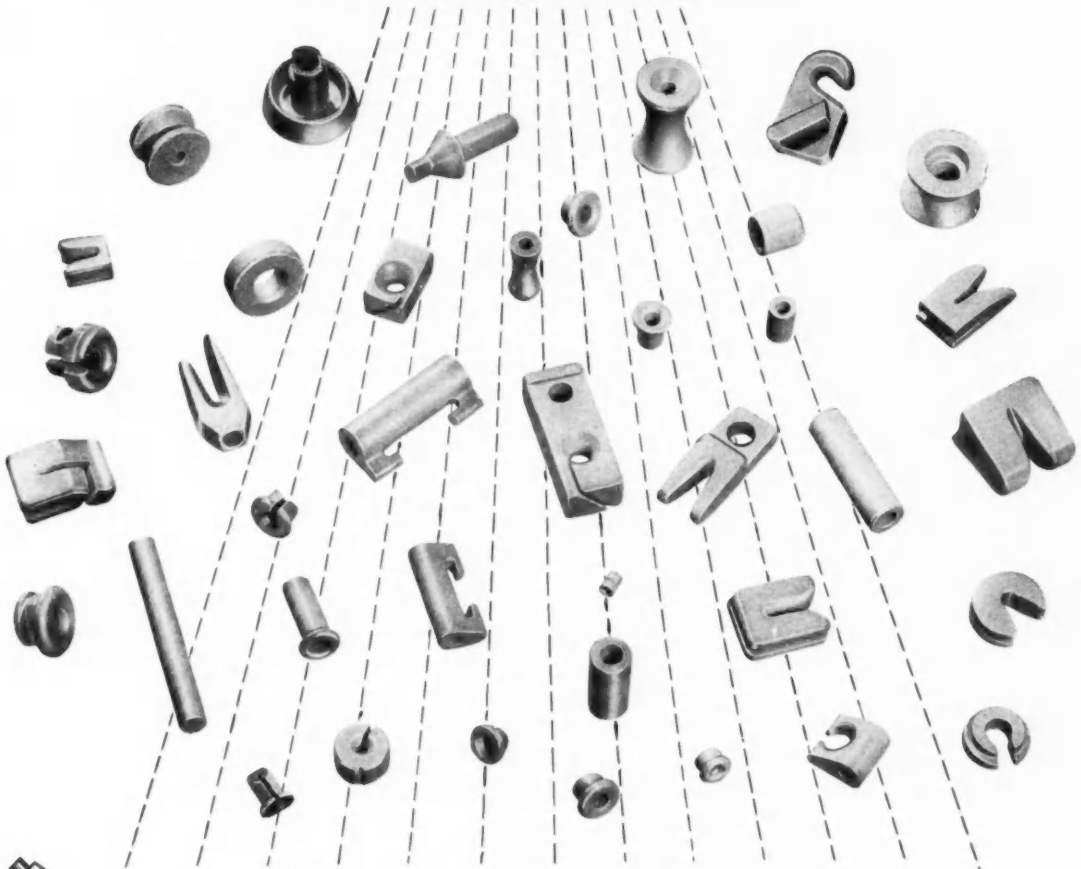

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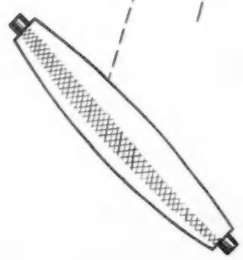

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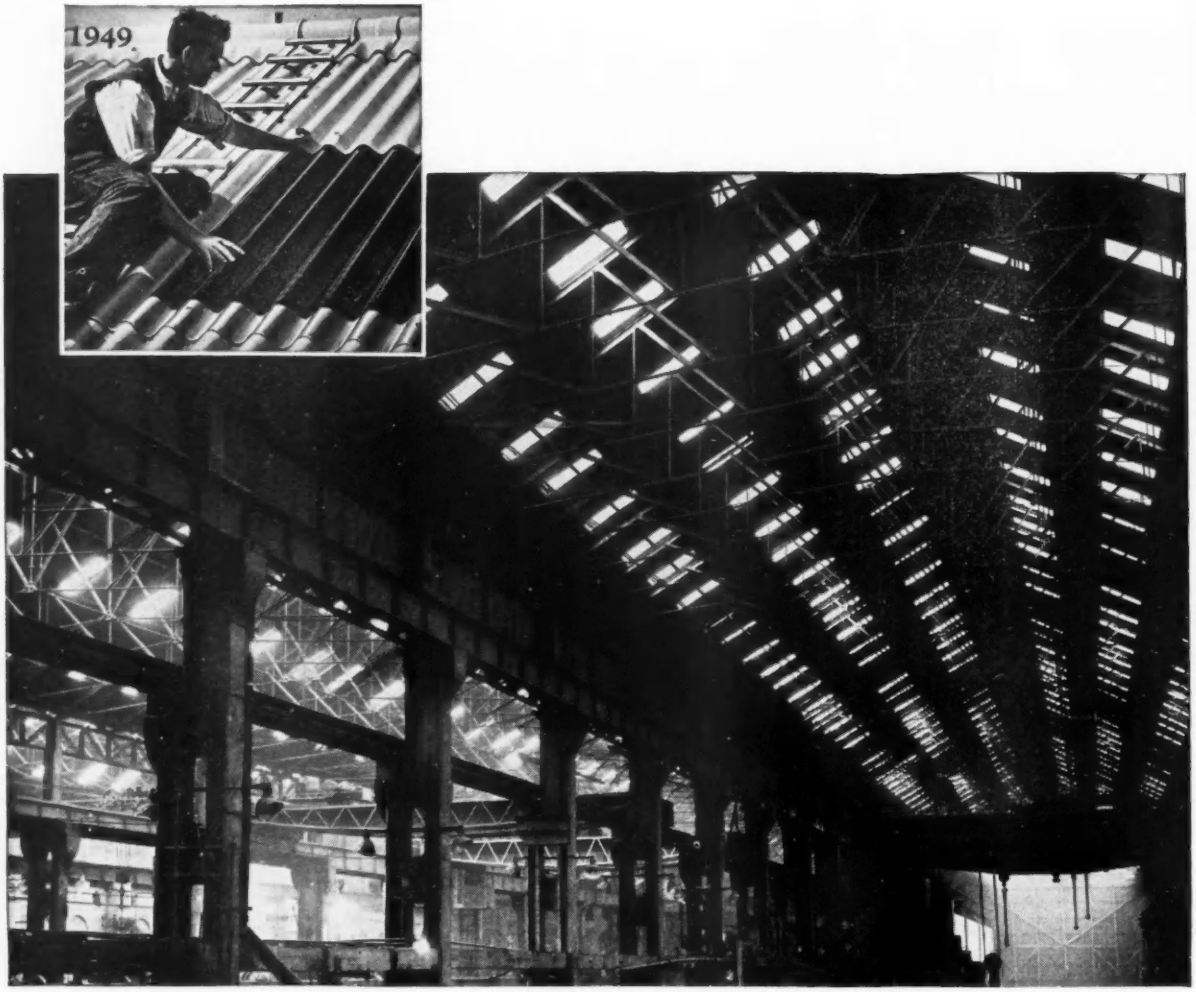


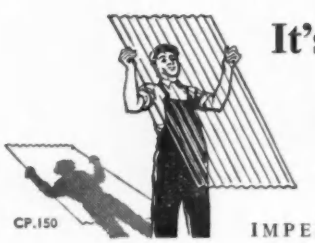
This installation of Corrugated 'Perspex' is in the factory of the North Eastern Marine Engineering Company Ltd., Wallsend, Northumberland. It has been installed over 8 years.

Corrugated 'Perspex' as efficient as ever after 8 years continuous use in engineering factory

FOR OVER 8 years Corrugated 'Perspex' has been in continuous use in a large engineering factory. Through all that time it has given good efficient service. Indeed, the North Eastern Marine Engineering Company Ltd. say in their letter that it has been so successful they have added considerable new installations of Corrugated 'Perspex'.

Corrugated 'Perspex' is immensely tough, light and unaffected by the corrosive atmosphere of most industrial areas. It withstands weather conditions in any part of the world.

It has other advantages. Corrugated 'Perspex' has a very high light transmission. It is easy and economical to install. Once in, there is an immediate saving on artificial light. There are a wide range of profiles, and if diffused daylight is desired, Opal Corrugated 'Perspex' is available.



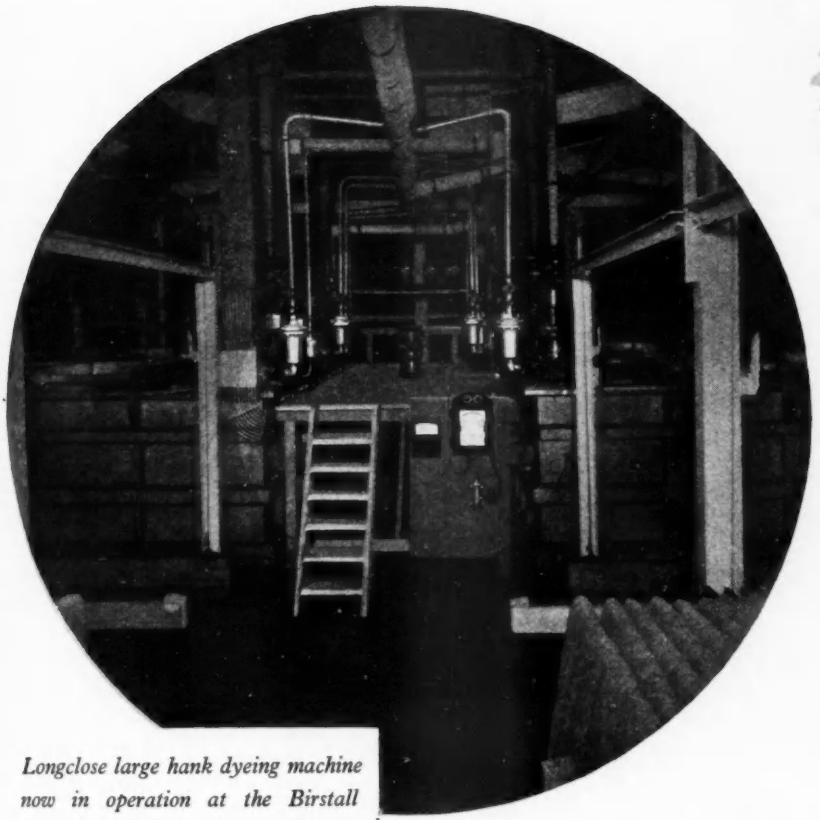
It's as clear as daylight—it must be

CORRUGATED 'PERSPEX'

'Perspex' is the registered trade mark for the acrylic sheet manufactured by I.C.I.

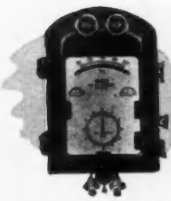
IMPERIAL CHEMICAL INDUSTRIES LIMITED · LONDON · S.W.1

CALL IN DRAYTON*



Longclose large hank dyeing machine now in operation at the Birstall Carpet Co. Ltd., for dyeing 9,000 lbs. of yarn at a time. 12,500 gallons of liquor are withdrawn, mixed and interchanged between four tanks and temperature control is a critical feature. Any slight difference in the rate of temperature rise between the tanks would cause lack of uniformity of shade. The machine is fully automatic: the temperature of the four vats is controlled by a Drayton D.V. 3 Dye Vat Control.

DRAYTON dye vat controls, for all types of dyeing machines, are completely automatic, absolutely dependable and do not call for skilled operators. They maintain a continuous degree of accuracy unobtainable by manual control. They reduce working costs and ensure improved and uniform production. For full information write for the booklet "The Application of Automatic Control to the Dyeing Process."



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Air or water operated controllers; expansion stem type.

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Self-operated controllers, for calorifiers, tanks, etc.

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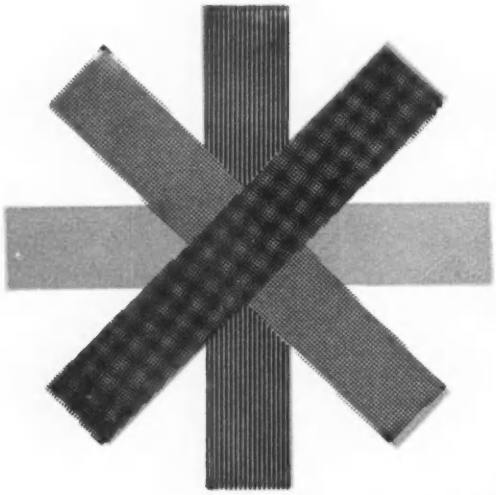
*and get things under control

A.C.29T.

Write to Dept. T.M.

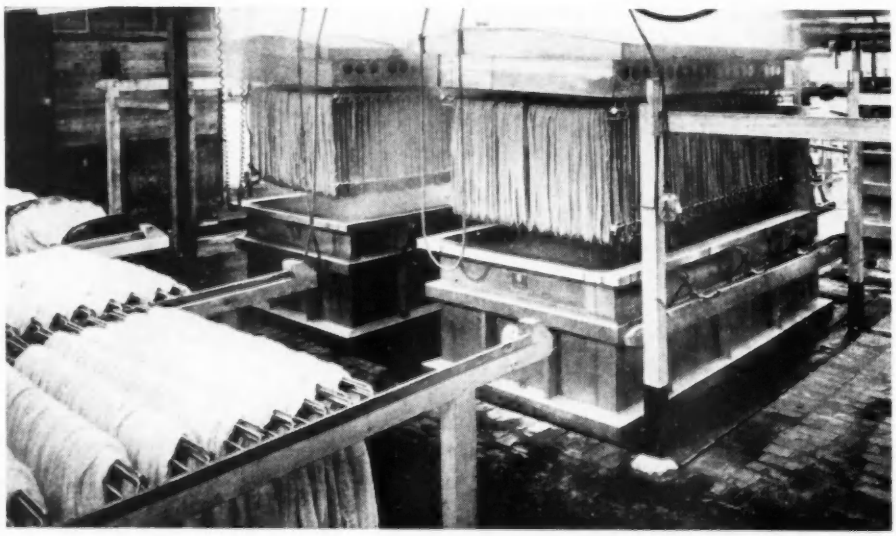
The Drayton Regulator & Instrument Co. Ltd., West Drayton, Middlesex. *Tel.: West Drayton 4012*



DOUBLE STICK HANK DYEING MACHINES

Suitable for dyeing Hosiery and Hand Knitting Yarns, Sewing Threads, High Bulk Yarns, Tapes, etc.

These machines, incorporating the Brown/Longclose Double Stick System (patent applied for) are available as single units for dyeing from 10-lbs. to 700-lbs and as coupled units to dye up to 1,400-lbs. to a single shade. When operating as coupled units an even shade is obtained and yarn from both units can be mixed indiscriminately.



(Photograph by courtesy of Messrs. Hawley & Johnson Ltd.)

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LONGCLOSE ENGINEERING Co LTD

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Crescent Works, Dewsbury Road,

LEEDS 11

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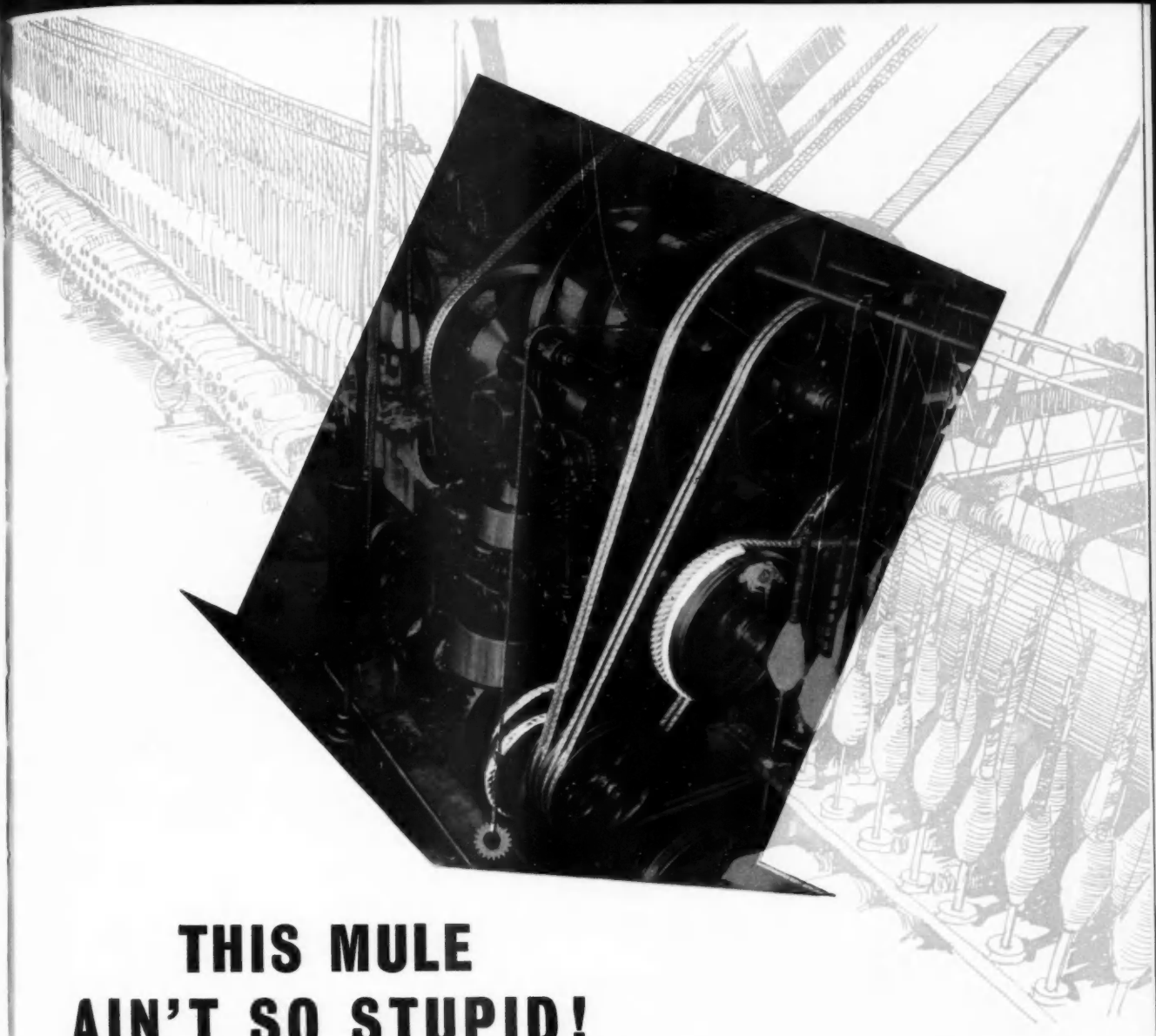

THIS MULE AIN'T SO STUPID!

The operators of this particular mule get quite a kick out of its increased efficiency since Ledray's Kirkstall Brand Textile Ropes were installed. The down band is a Cotton rope, both rim and draw bands are made of Nylon, while the scroll bands are of blended Nylon and Cotton. Kirkstall Brand Textile Ropes and Bandings are now available in Cotton, Nylon and Terylene, or Cotton blended with Nylon or Terylene. Please write for our technical advice if in doubt as to the best type of rope for your requirements.

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Typical Variable Speed Motor Gears
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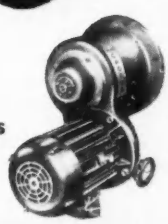

Typical Variable Speed Motor Gears
Publication 5739

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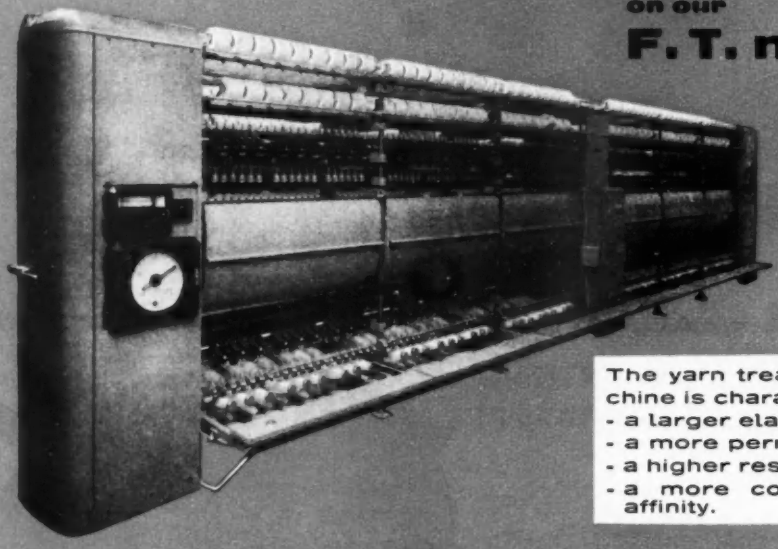
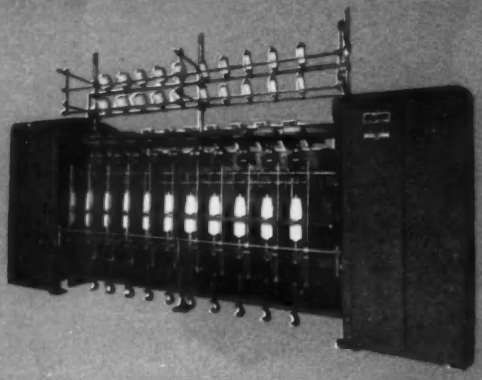
REPRESENTED THROUGHOUT THE WORLD

all the crimped thermoplastic yarns are produced under the best safety conditions on our F. T. machine

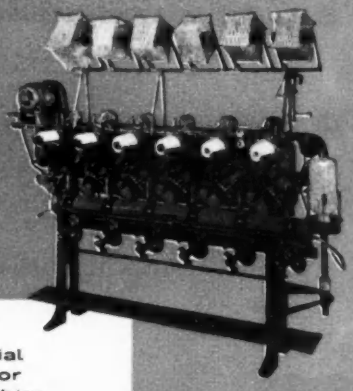


The yarn treated on this machine is characterized by:
- a larger elasticity
- a more permanent crimp
- a higher resistance
- a more constant tinctorial affinity.

finishing machines



AR. 4 Assembling Twisting Machine with large capacity



M Winder

with its special attachment for building bobbins of controlled hardness

ATELIERS ROANNAIS
de Constructions Textiles
ROANNE - Loire - FRANCE

STUBBS

OZRI

High Speed Cone Winder

Machines constructed to contain any number of heads up to 120.

Winding speeds of over 1,000 yards per minute obtainable.

Each head independently driven.

Automatic stop motion for each head.

Travelling conveyor for empty supply packages fitted to each side of machine.

Conditioning and Waxing attachments supplied on request.

Variable speed drive can be fitted if desired.

Machine simple in operation.

Low maintenance costs.

Makers of Machinery for:

WINDING, DOUBLING, CLEARING, GASSING, REELING, PREPARING, POLISHING AND BUNDLING

all classes of Yarns and Threads

JOSEPH STUBBS LTD

MILL STREET WORKS, ANCOATS, MANCHESTER 4

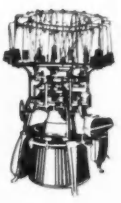
Telephone: COLlyhurst 1721 (3 lines) *Telegrams*: 'WINDING, MANCHESTER'

BENTLEY

High Pile

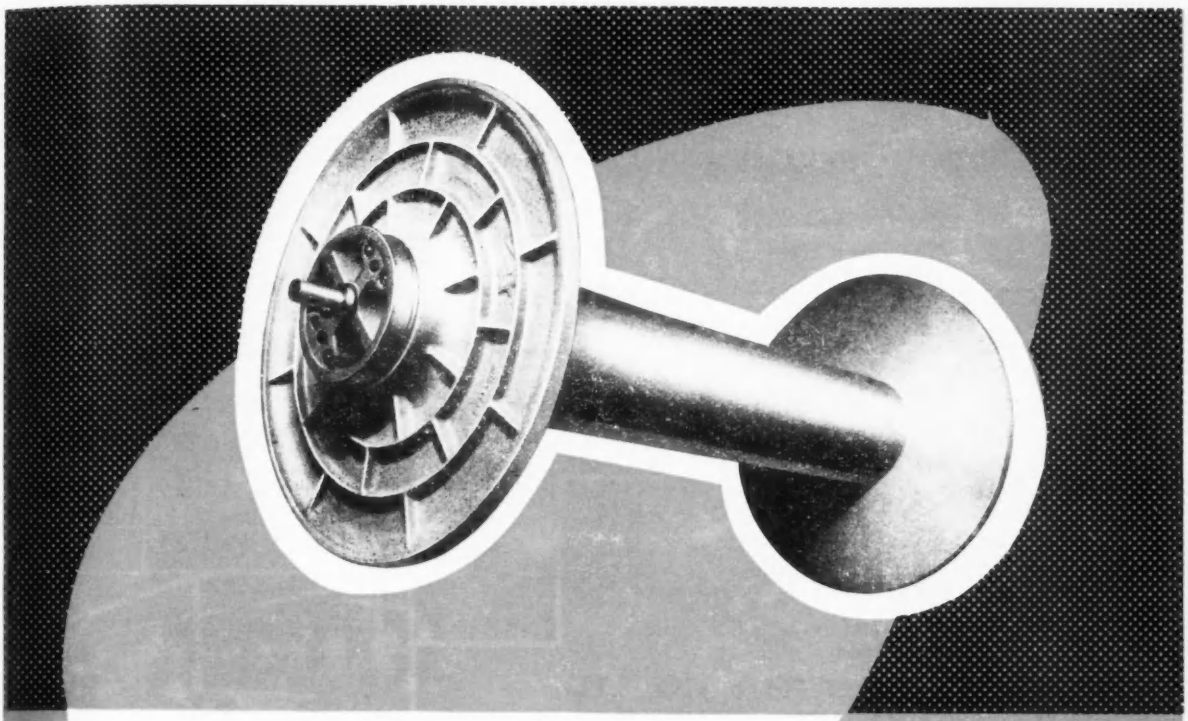
4RY MACHINE

The New Mellor Bromley 4RY machine in 24" diameter and with eight knitting feeders, produces approximately 11 yards of high pile fabric per hour and requires only one operator for four machines. By the use of appropriate natural or man-made yarns or combination of both, a wide range of fabric qualities and finished effects can be obtained, suitable for a wealth of applications.



Built within the Bentley Group by : **MELLOR BROMLEY & CO. LTD., ST. SAVIOURS ROAD, LEICESTER**

Telephone : 38161 *Telegrams :* AUTOMATIC, LEICESTER TELEX. *Telex No. :* 34622



LIGHTER ALL METAL HIGH SPEED BEAMS

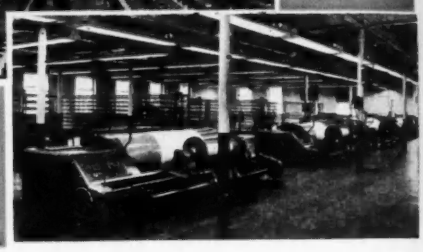
Dynamically balanced for smooth efficient running

Produced in 'Elektron' Magnesium Alloy which is 40% lighter than Aluminium, with equal strength properties. Other products include dynamically balanced Backing Drums, Adjustable Flanged Beams, Section Warp Beams, Loose Flanges, Jacquard Cylinders and larger type Bobbins, made to our exclusive design or customer's specific requirements. The services of our Textile Technical Department are at your disposal for information and advice in connection with the above, or any new projects.

STERLING METALS LTD.

NUNEATON : NUNEATON 4221

Built on World Achievements



Following each and every new idea, testing and trying out each new process. Aware of the keenest competition. An experienced executive at your service, always seeking the latest trends in both discovery and production. We can be satisfied with nothing less than the best the world produces. That is why we have progressed into an organisation second to none in our great industry.

HIGH GRADE THROWN SILK NYLON "TERYLENE" AND RAYON

FOR WEAVING. Nylon and "Terylene" on Cheese, Pirn or Beam. Silk Organzine and Tram.
FOR HOSIERY TRICOT, etc.: Nylon and "Terylene" in all deniers, in various twists. Silk Crepe, Grenadines, Compenzines, etc.
LACE YARNS: Nylon and "Terylene" in various deniers.

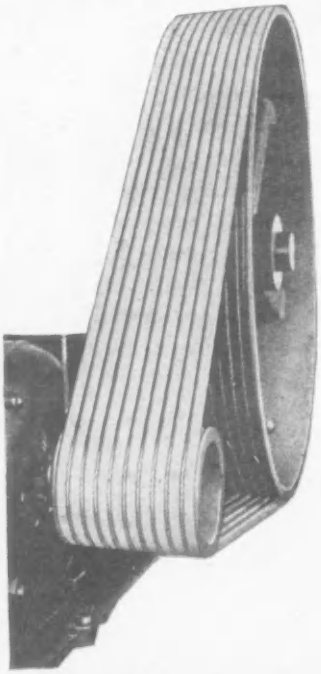
G. H. HEATH & CO. LTD.
SILK AND NYLON THROWSTERS
MACCLESFIELD *Telephone*: 2232 (4 lines)
Also at: Sandbach, Middlewich, Kidsgrove and Congleton
Licensed Producers of FLUFLON (Regd) FLUFLENE (Regd) Brand Crimp Yarn

WIGGLESWORTHS

POWER TRANSMISSION ENGINEERS

Makers of

"TEXROPE" V DRIVES

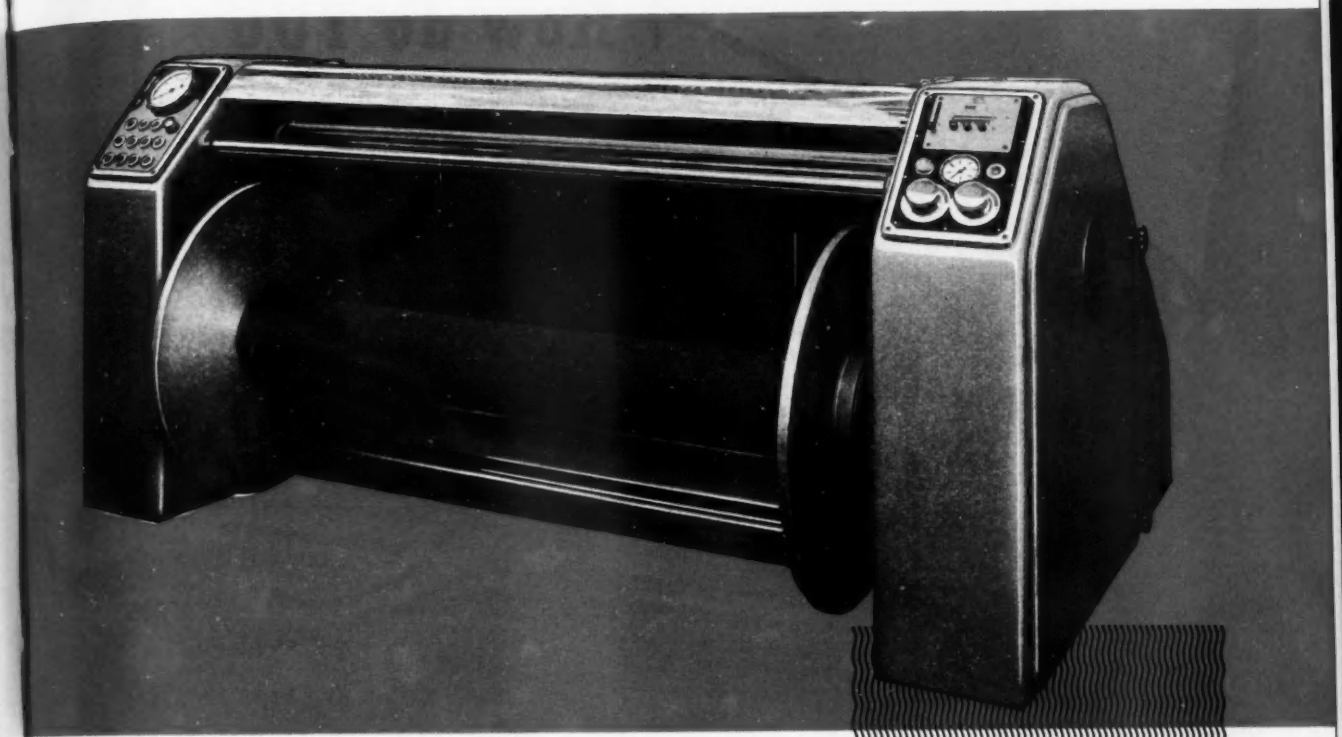


"TEXROPES" FOR TEXTILE DRIVING

FRANK WIGGLESWORTH & CO. LTD
ENGINEERS
SHIPLEY YORKS

'Phone: SHIPLEY 53141 Grams: CLUTCH, SHIPLEY

LATEST MODEL HIGH SPEED BEAM WARPER, TYPE Z.7



Electro-hydraulic operation

Remote control

Direct drive of beam

For hard AND soft beams

Winding speed up to 650 yards per minute

Accommodates beams of up to 31·5″

Pressure range 0 to 660 lbs., infinitely variable

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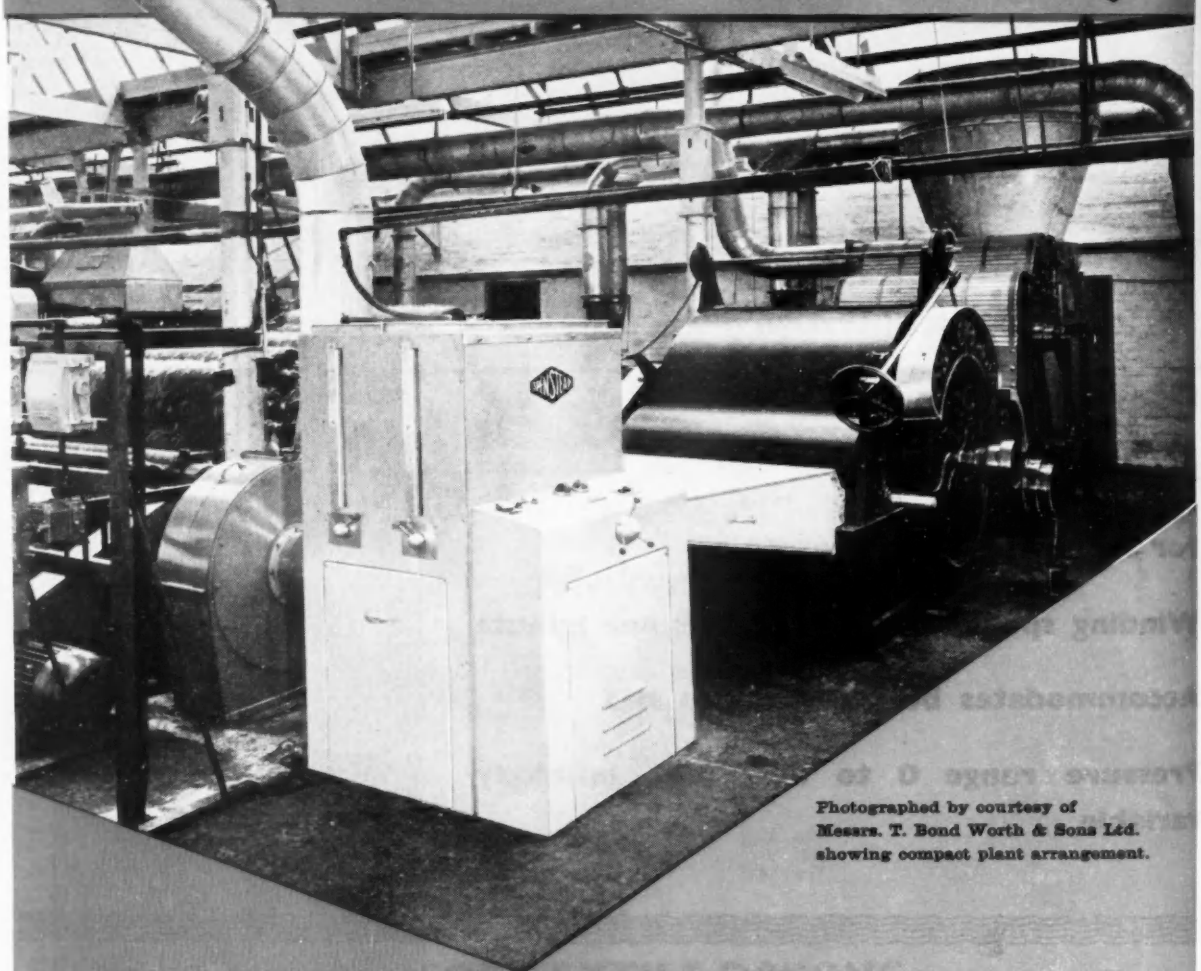
MASCHINENFABRIK M.-GLADBACH (WESTERN GERMANY)

How do YOU oil Wool?

With this new Vortex Wool Oiler you just set the quantity control, "switch on" and the rest is automatic. Wool flow and oil flow are synchronised—No pumps—No compressed air—no jets to make up—no trouble. Only the new Vortex has all you ever hoped for.



Photographed by courtesy of Messrs. T. Bond Worth & Sons Ltd. showing compact plant arrangement.

it's no trouble with SPENSTEAD NEW Vortex Wool Oilers

SPENCER & HALSTEAD LIMITED · Bridge Works · Ossett · Yorkshire · Telephone: Ossett 821/4 · Telegrams: SPENSTEAD OSSETT

P1184

MILL MODERNIZATION

CASE HISTORY No. **D**

Coarse count cotton yarns (8's, 12's) were being spun in this mill from inter bobbins on single apron frames. Excessive channelling of the top roller coverings particularly on the middle line was taking place causing erratic drafting and consequently thick and thin yarn.
Armstrong CL/S cots were installed on both back and middle lines and 738 covered rollers on the front line. This combination proved to be highly resistant to wear and their high frictional properties gave positive fibre control and resulted in much improved regular yarn.

Armstrong Accotex Cots and Aprons give improved drafting for greater yarn regularity and increased wear resistance to withstand synthetic fibres. They possess electrolytic properties which decrease roller laps and by their longer life reduce costs.

Armstrong ACCOTEX® COTS & APRONS

For full details write to :—

ARMSTRONG CORK COMPANY LTD., 210-213 ROYAL EXCHANGE, MANCHESTER 2. Telephone: DEAnsgate 7311/2. And at Peckover Street, Bradford and Kemback Street, Dundee.
Regd. Office: Kingsbury, London, N.W.9. Factories: OLDHAM and GATESHEAD-ON-TYNE.

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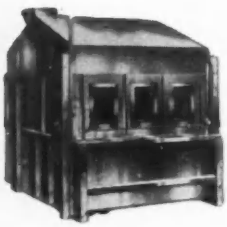
P1164

DYEING AND FINISHING MACHINES

PRESSURE DYEING MACHINES

A complete range of machines for dyeing all types of fibre in every stage of manufacture including loose, top, beam, hank and package forms. Also rapid package drying machines.

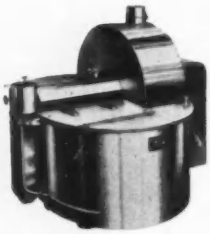


FABRIC AND PIECE GOODS

Machines available in several capacities for dyeing knitted fabrics, silk or rayon and woollen or worsted piece goods in rope form.

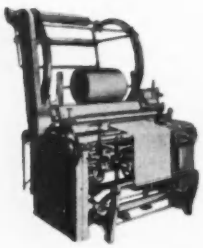
ROTARY DYEING MACHINES

Totally enclosed rotating drum machine for dyeing nylon, pure silk, rayon and cotton hose with perfect penetration and uniformity. Stainless steel in 25, 50, 100, and 200 lbs. capacities.



PADDLE DYEING MACHINES

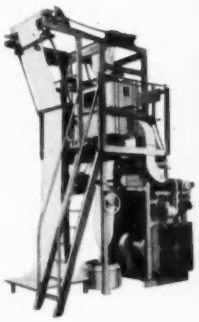
A versatile machine in stainless steel for ladies' hose, half-hose and loose articles. Also used for anti-shrink and bleaching. 4 capacities from 12-200 lbs



CALENDERS

Medium type in 2 sizes with single or twin feed for finished fabric widths up to 59". Light type and continuous blanket heavy type Calenders are also available.

PEGG

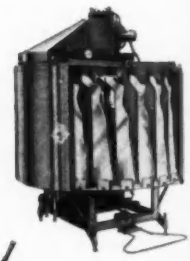


FABRIC DRYING MACHINES

The Pegg-Pasold machine for continuous drying of all circular and warp knitted fabrics in a relaxed condition.

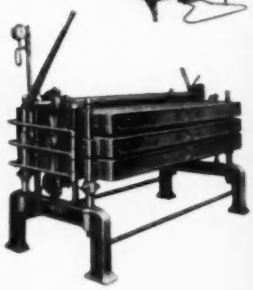
FABRIC FINISHING MACHINES

The Bromac machine imparts a luxury finish to knitted fabrics. Automatic for finished widths up to 33".



HOSE FINISHING MACHINES

Forms move through circular drying chamber at low temperature to ensure perfect matt finish, to nylon hose.

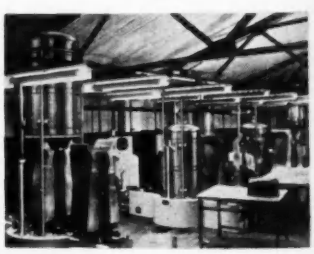


PRESSES

3 and 2 bed presses for finishing all classes of hose, half-hose and similar articles.

PRE AND POST BOARDING MACHINES

This new machine with 96 forms enables 4 sizes or types of hose to be processed without risk of mixing, speeds up output and gives greater time and temperature control.



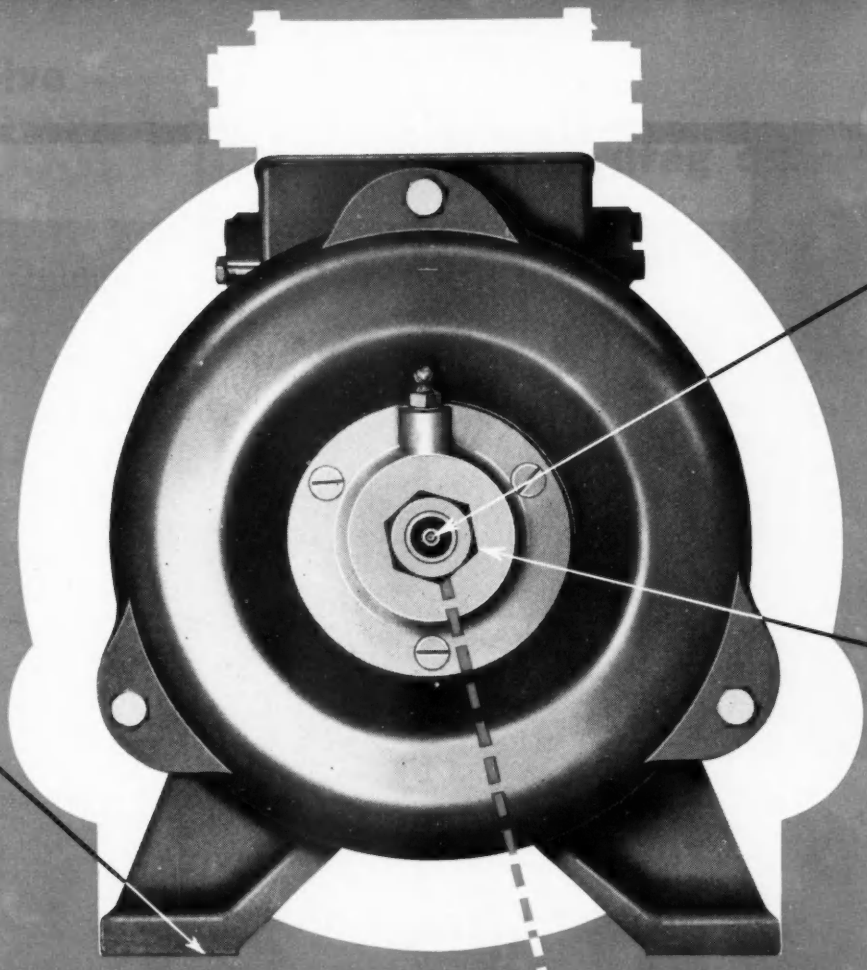
Builders of dyeing machines for loose stock, hanks, packages, piece-goods, fabric and hose ; also finishing machines for all classes of circular knitted and warp loom fabrics and garments. Pre-boarding and finishing machines for nylon hose.

A Member of the Bentley Group

SAMUEL PEGG & SON LTD. Barkby Rd. Leicester England.

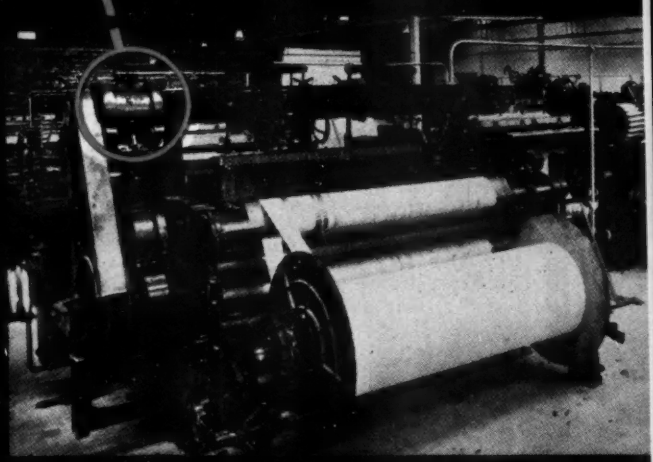
Telephone: 66651
Telegrams: 'PULSATOR'

SP 6


Fully interchangeable in the ¼-1¼ h.p. range and the 2-3 h.p. range.
Standard centre height.
Standard base for slide or frame mounting.
Standard shaft diameter.

G.E.C. interchangeable loom motors

G.E.C. Loom motors seldom demand a moment's attention. Designed to develop a high starting torque, they ensure a correct first pick and beat up. To withstand the severe cyclical variations in speed and load imposed by the looms, the motors have to be as tough as indeed they are. Available from stock, G.E.C. motors are renowned for reliability, the quality which counts most. For full details write for Technical Description No. 347.



G.E.C. textile electrification

THE GENERAL ELECTRIC CO. LTD., MAGNET HOUSE, KINGSWAY, LONDON, W.C.2

SIR RICHARD ARKWRIGHT
(1732–1792)

Sir Richard Arkwright

AND COMPANY

Yarn Sales Division of English Sewing Cotton Company Limited

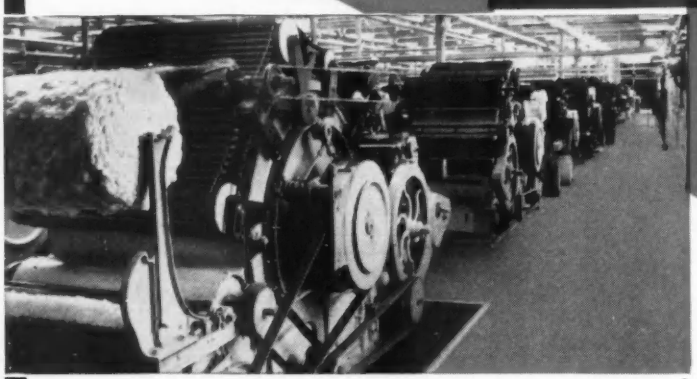
spinners, doublers

dyers and

processors of

cotton and

synthetic yarns



"Ban-Lon" and

crimp yarns

a

speciality.

Arkwright House, Manchester 3

TELEPHONE: BLAckfriars 2383 (7 lines) TELEGRAMS: "STITCHING" MANCHESTER

LEICESTER OFFICE: 50, LEICESTER ST., EAST PARK RD

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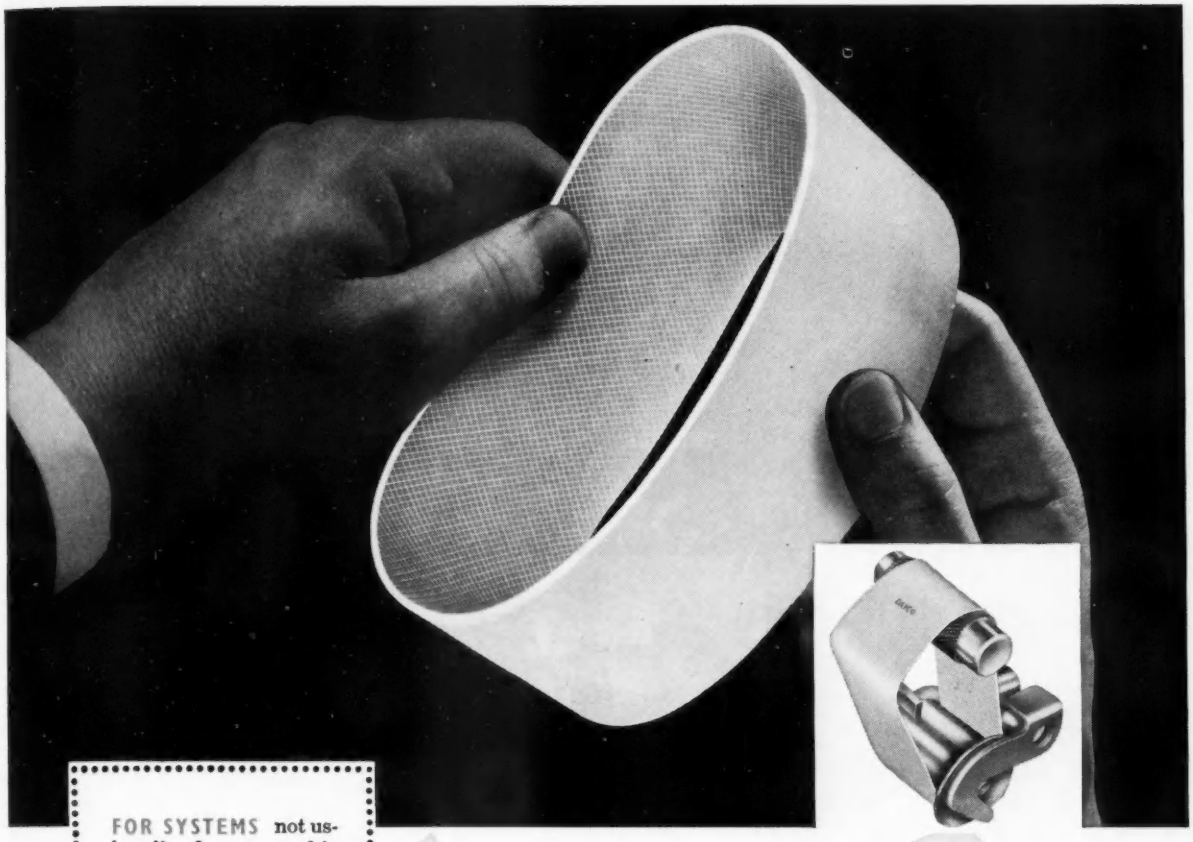
Mills: BELPER, MATLOCK, NEILSTON, OSWALDTWISTLE, PENDLEBURY SKIPTON, STOCKPORT

Exclusive EMBOSSED DESIGN reduces drag over nose-bar



FOR SYSTEMS not using fixed centers, this first really NEW apron design in 20 years, cuts nose-bar drag in half. Run your thumb over the inside surface of the Dayco apron, and see how it glides effortlessly over the raised bosses.

LAB. REPORTS disclose Dayco's exclusive embossed design "has less friction drag than all others tested" . . . "shows 50% less waste collection at the nose-bar"-"gives no evidence of chatter or tucking action at the bar."

EMBOSSED DESIGN on the inside surface makes the big difference in drafting performance, reducing the area of contact over the nose-bar, to achieve the lowest possible coefficient of friction.

COSTS NO MORE Dayco users pay no premium for embossed design . . . adds still another inducement to specify only Dayco Aprons. Premium drafting performance . . . at regular price.

AVAILABLE NOW. If you are presently using size B-60 or larger aprons, the embossed design is now available. Call your Dayton distributor or order from your Dayco representative on his next call to your mill.

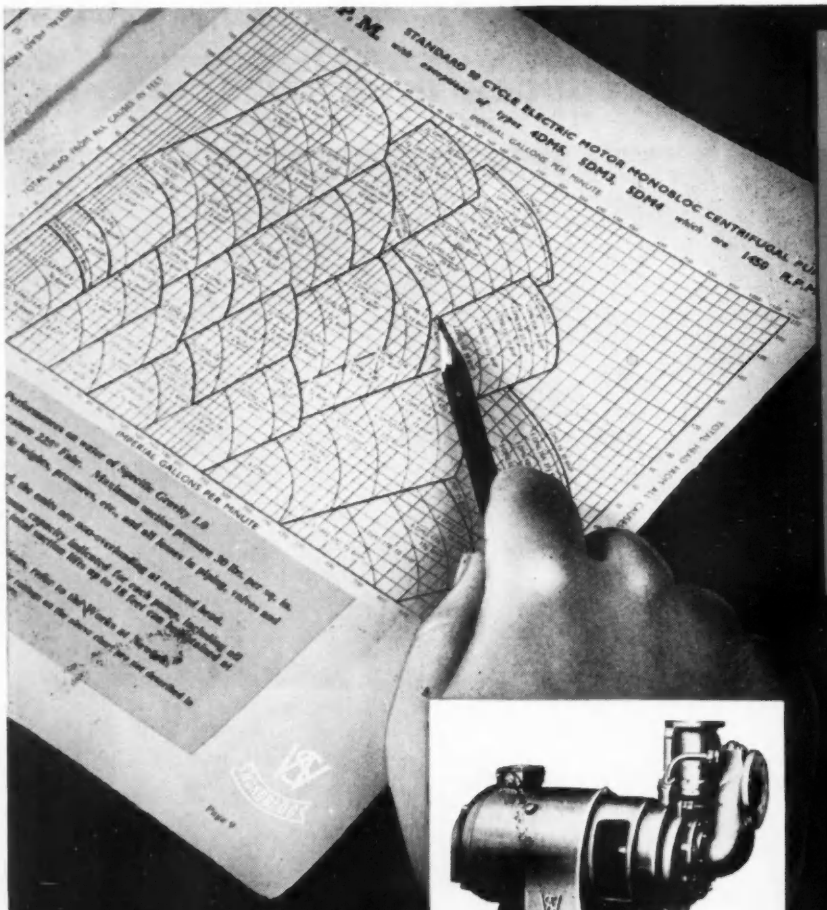
Here's immediate relief from chatter and apron drag, collection of waste fibers, and variations in drafting speeds for users of drafting systems not employing fixed centers. Watch for the revolutionary new Dayco, with exclusive embossed design, in sizes B-60 or larger.

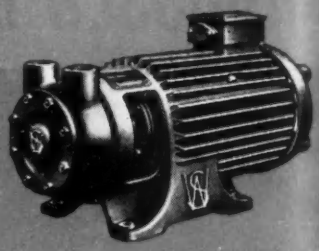
You can contact your Dayco representative by writing The Dayton Rubber Company Ltd., Lancashire Sales Division, Heaton Norris, Stockport. Telephone: Stockport 3464

MANUFACTURED BY

Dayton Rubber

DAYTON WORKS - BALGRAY STREET - DUNDEE


R.M.
STANDARD 50 CYCLE ELECTRIC MOTOR MONOBLOC CENTRIFUGAL PU
with dimensions of type 4DM2, 5DM2, 5DM4 which are 1450 R.P.M.
IMPERIAL GALLONS PER MINUTE
Performance on water of Specific Gravity 1.0
Page 9



TYPE TM

SMALL CAPACITY
HIGH HEAD SINGLE-STAGE PUMP

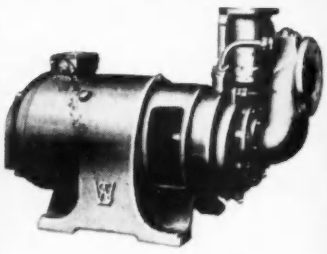
For handling up to 1800 G.P.H. and heads up to 300 feet.

Patent No. 591835

the right pump

for the job

The magnitude and scope of the Worthington-Simpson range of Monobloc Pumps now makes it possible to select a model which meets most requirements. This modern range of centrifugal pumps combines motor and pump in one compact balanced unit, eliminating separate driving motors, bedplates, belts, pulleys and couplings. Only one shaft is used, ensuring perfect and maintained alignment between motor and pump avoiding the danger of distortion during installation.



CEVAC

SELF-PRIMING
CENTRIFUGAL PUMP

For capacities up to 350 g.p.m. and heads up to 130 feet, available in sizes 1" to 3" and 1 to 20 B.H.P.

Patent Nos. 582355 & 591835

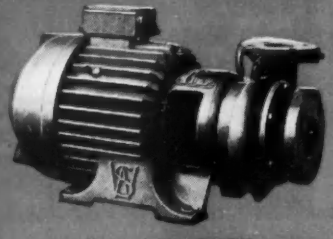
TYPE DDM

TWO-STAGE
CENTRIFUGAL PUMP

In capacities from 10-200 g.p.m. and heads up to 380 feet.

Patent No. 591835

MONOBLOC PUMPS



TYPE DM

GENERAL PURPOSE
CENTRIFUGAL PUMP

In a comprehensive range of sizes handling up to 1200 g.p.m. heads up to 210 ft. Catering for most of the standard voltages in the world.

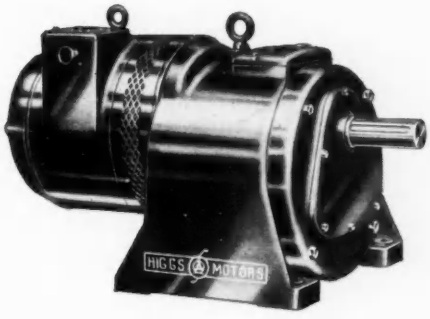
Patent No. 591835

Separate literature on all models is available on request

Worthington - Simpson LTD. NEWARK, NOTTS.

P.665

GEARED MOTOR UNITS



ALL YOUR MOTOR REQUIREMENTS

PRICES — COMPETITIVE

DELIVERY — STANDARD STOCK

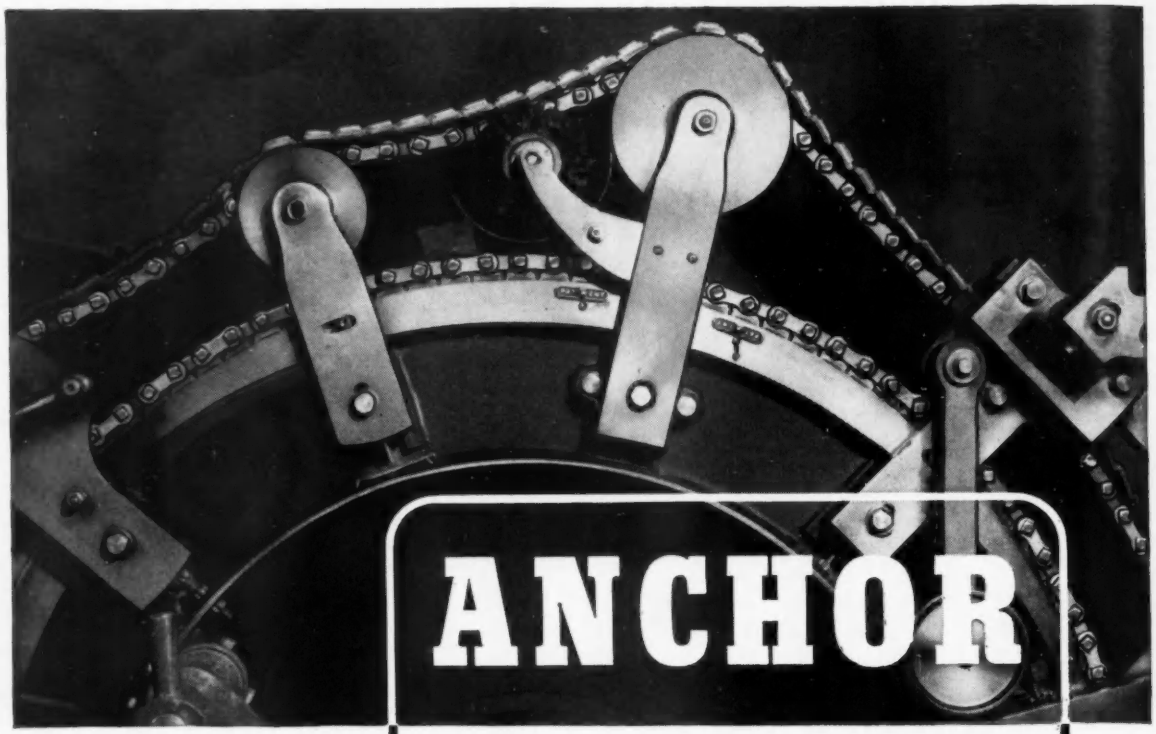
TRADE MARK

HIGGS MOTORS LTD

MANAGING DIRECTOR DAVID C.Y. HIGGS. A.M.I.E.E.

BIRMINGHAM 6 ENGLAND

AGENTS AND BRANCHES COVER THE WORLD



ANCHOR

FLAT CARD CHAINS
available FROM STOCK

A NEW SERVICE

Chains are now supplied boxed in pairs, for cleanliness of handling and storage. Right and left hand screws are also available, thus ensuring a 100% job.

ANCHOR CARD CHAINS ARE MANUFACTURED FROM HIGH QUALITY STEELS WHICH ENSURE LONG LIFE AND FREEDOM FROM BREAKDOWN. SIZES AND LENGTHS TO SUIT BRITISH, CONTINENTAL AND AMERICAN MACHINES.

ANCHOR CHAIN COMPANY LIMITED · OLDHAM · ENGLAND
(Subsidiary of RENOLD CHAINS LIMITED)
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he knows his pirn changers * inside out thanks to the sound basis given to him by a **+GF+** instruction course.

Remember:

The **+GF+** after sales service helps you to get the maximum out of your Fischer conversions.

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George Fischer Limited, Schaffhausen, Switzerland

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Barke Machinery,
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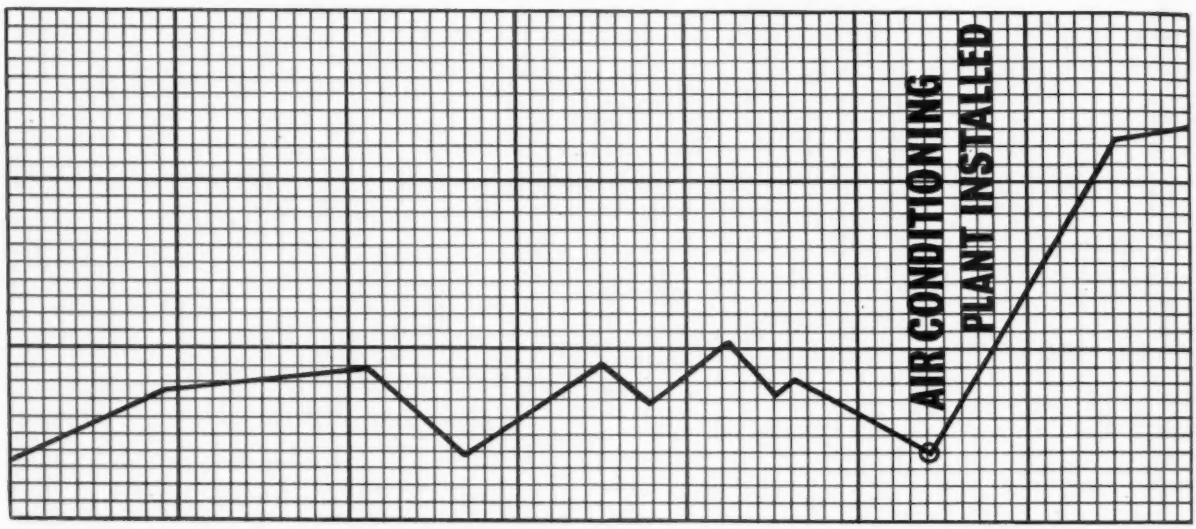
Ashton-under-Lyne.

CONDITIONED AIR—LESS WASTE
LESS WASTE—MORE PRODUCTION
MORE PRODUCTION—HIGHER PROFITS



HanK Air Conditioning creates the right atmosphere for maximum production.

So often the basic essentials are seen last of all. The most modern machinery, the most efficient methods, the most generous incentives to the workers, all fail to produce the best results without air conditioning.

This is a proved fact. Outside your factory the weather can do its worst, and often does, but there is no reason why this polluted air should remain in your premises, adversely affecting the quality of your goods and the health of your staff.

The particular problems of the Textile Industry are well known to us. The benefit of our experience is yours for the asking—entirely without obligation.

Hall & Kay Ltd.

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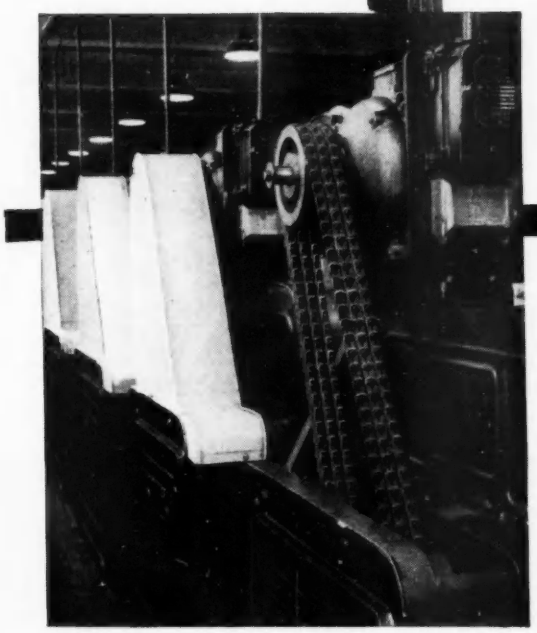

Three "C" section Dixlink belts transmitting 10 h.p. on a ring spinning frame at 1440 r.p.m., in a Blackburn Mill.

Dixlink is manufactured in sizes covering the rubber vee rope range with 40° angle sections. Also supplied in 28° angle sizes. Manufactured to Dick standards of quality—which are *the* criterion in the trade—Dixlink can be installed and running in a matter of minutes. Dismantling costs and production hold-ups are eliminated and the problems of fixed centres and structural restrictions are removed. Dixlink saves space by ending the need to carry large stocks and the costs of storage and depreciation are reduced. Four coils of 50 ft. each in the M, A, B and C profiles can provide replacements for the entire range of standard vee belts in these sections.

Also available in "double vee" sections. Dixlink can be supplied in oil and heat resisting qualities. Dixlink is undoubtedly the cost-saving answer to your vee belt problems. A technical brochure, covering applications and horse power ratings, will be sent on request.

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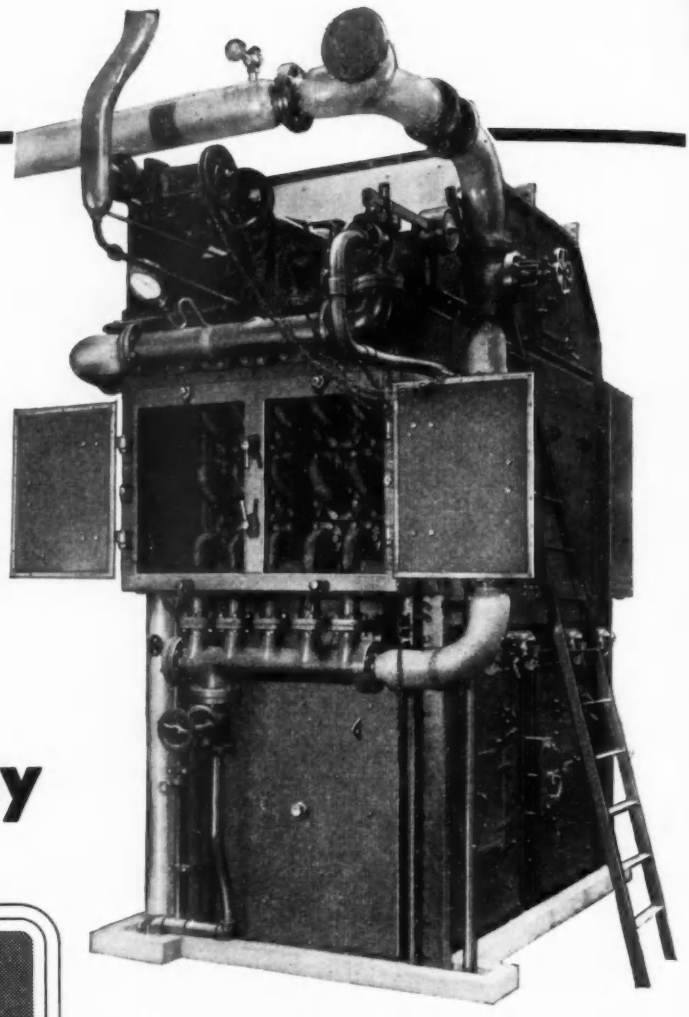

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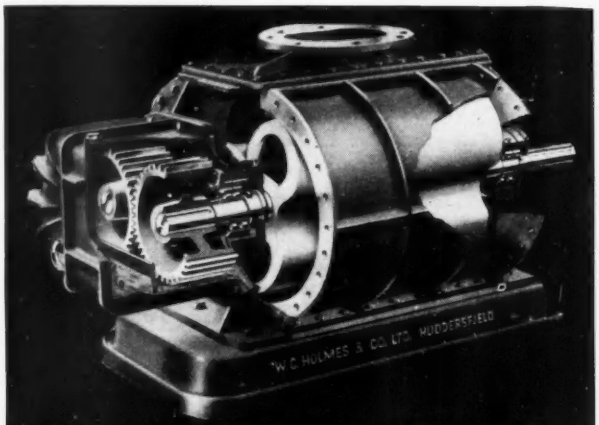
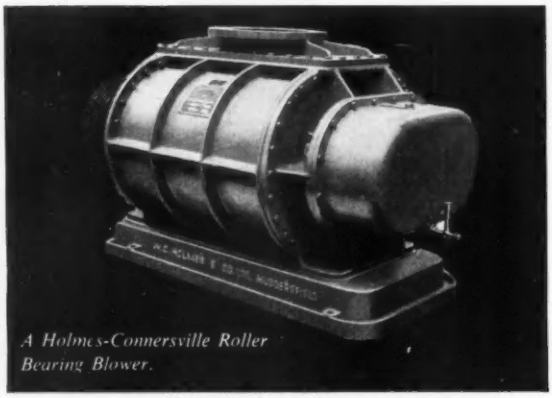


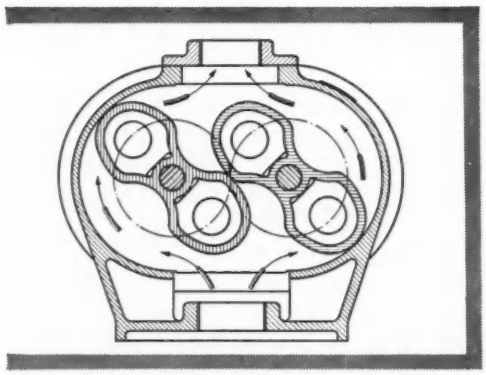
A cut-away view of a Holmes-Connersville Roller Bearing Blower.


A Holmes-Connersville Roller Bearing Blower.

Holmes-Connersville Positive Air Blowers have been designed to give continuous trouble-free service and are consequently of extremely sturdy construction. This, combined with minimum maintenance and low running costs, makes them eminently suitable for a wide range of applications where air is required at pressures up to 10 lbs. per sq. inch. They are also suitable for low and medium vacuum conditions.

PRINCIPLE OF OPERATION

Two impellers on parallel shafts rotate in opposite directions. As they revolve, air is drawn into the space between the impeller and the casing, where it is trapped as the tip of the impeller passes the edge of the inlet opening. Continuing its rotation, the opposite tip of the impeller passes the edge of the outlet opening and the trapped air is pushed through the outlet into the air line. This action is repeated twice for each revolution of the impeller, or four times for each revolution of the driving shaft.



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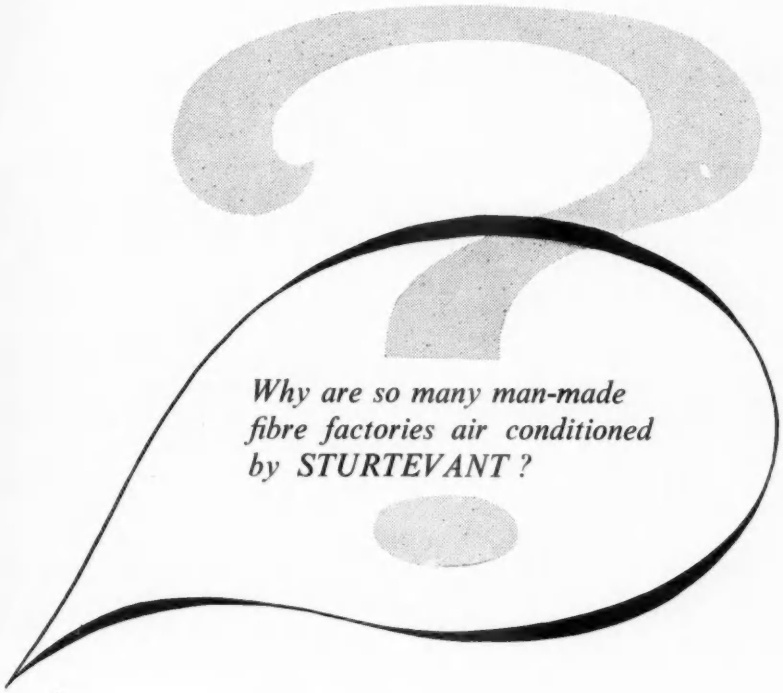

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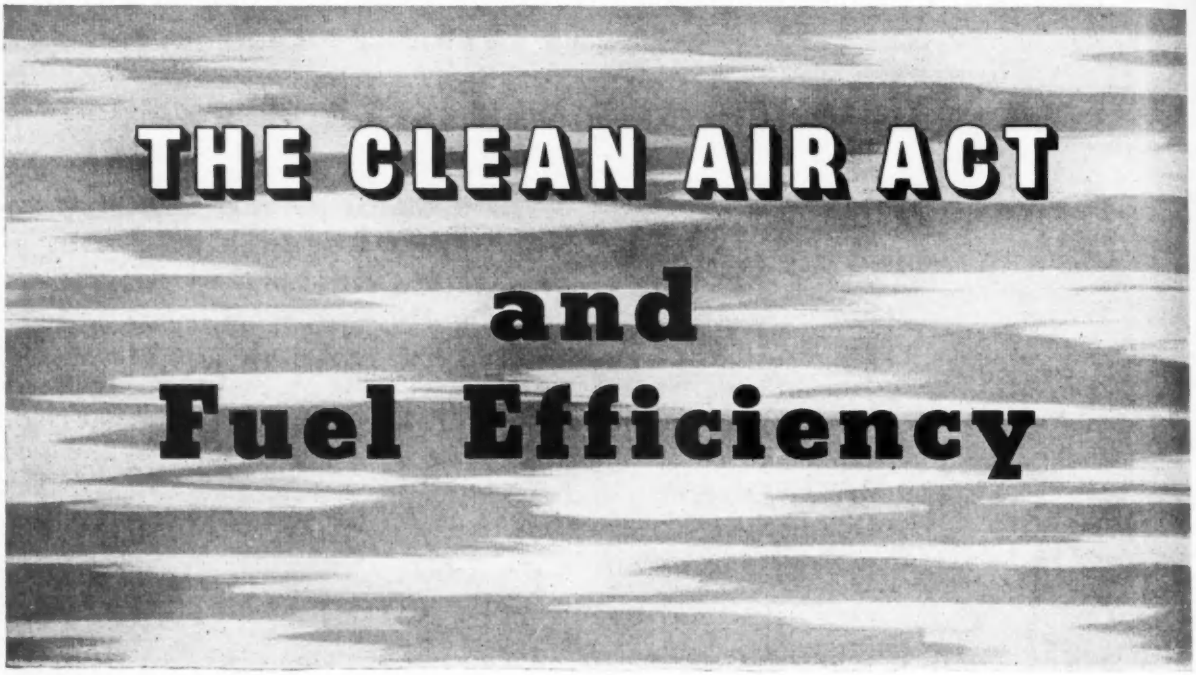

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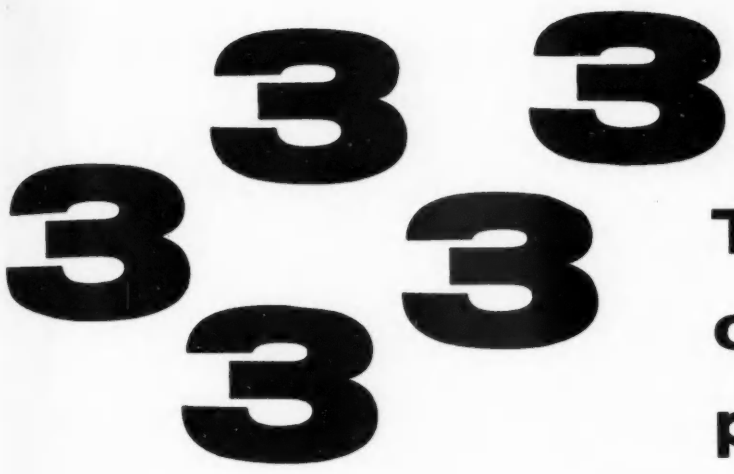

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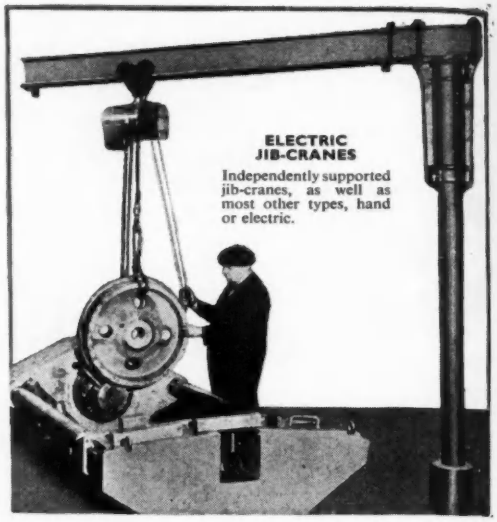

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Extra light in weight. Ideal for maintenance work. Sizes ½ to 5-tons.

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Highly efficient ball bearing pulley-blocks, with genuine triple-gear mechanism. Sizes up to 20-tons.

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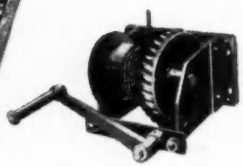

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Self-sustaining, machine-cut worm-gear wire rope wall hoists in sizes from ½ to 2 tons.
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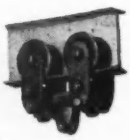

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Travelling trolleys, geared or ungeared and adjustable for varying track widths, for either straight or curved tracks.

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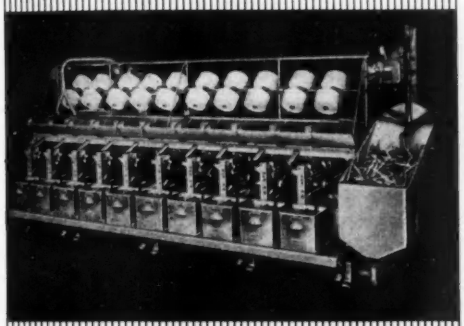

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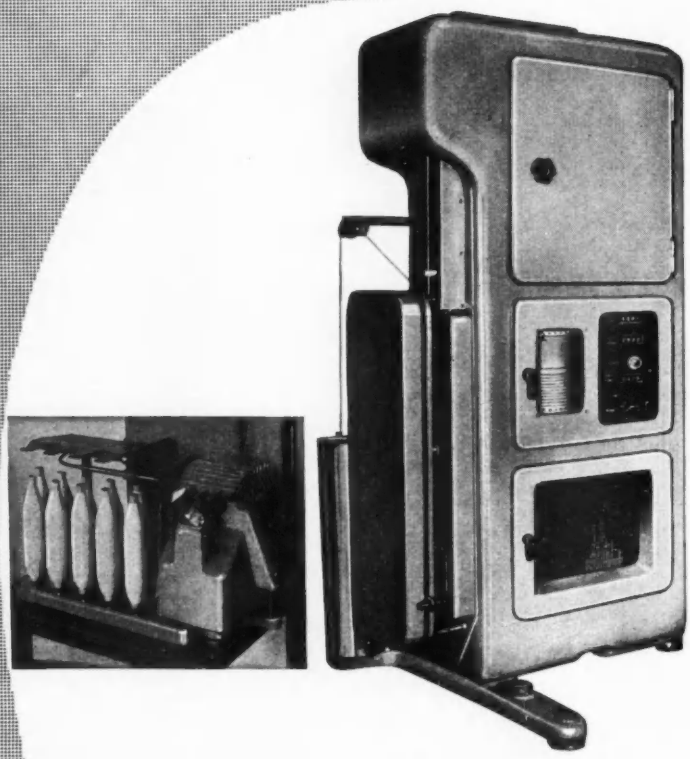
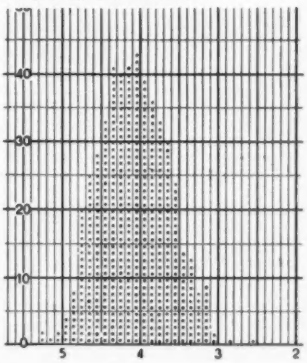
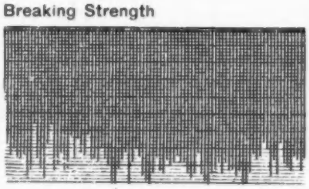


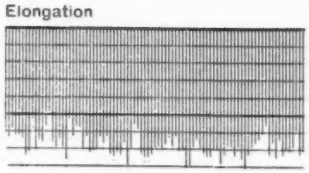
Frequency Distribution



Breaking Strength



Elongation



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Determines the breaking load and elongation of Single Threads

The continuous recording of the breaking load values shows periodical variations of the breaking load or elongation. The longer the period of testing, the easier it is to draw conclusions in ascertaining the cause of variation. The use of the Multiple Bobbin Attachment allows continuous testing of several bobbins.

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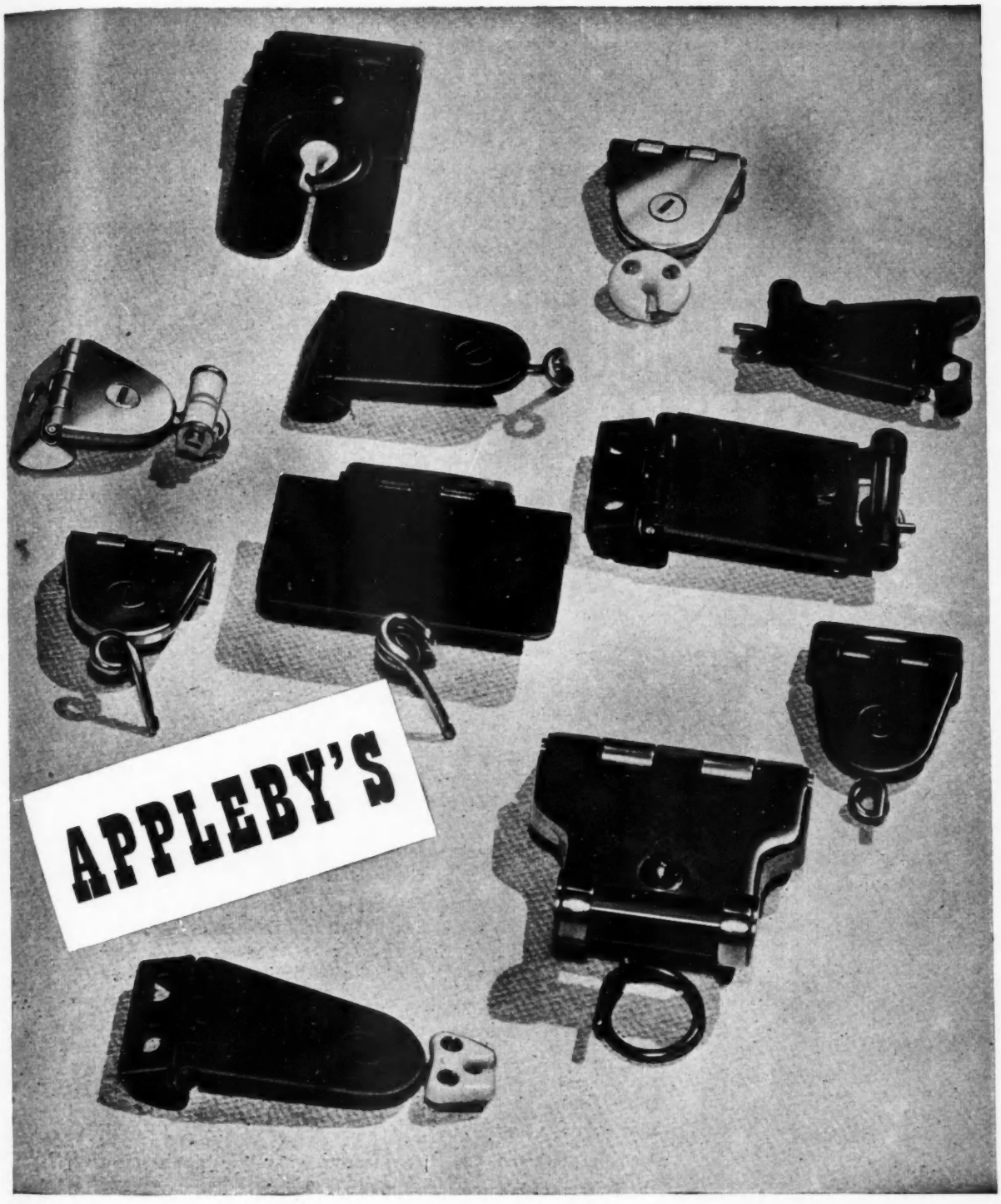

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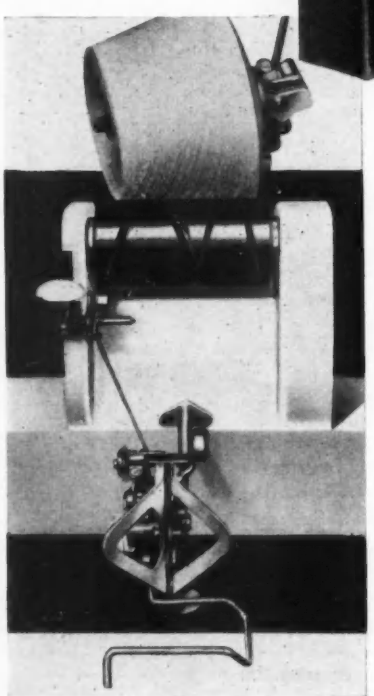

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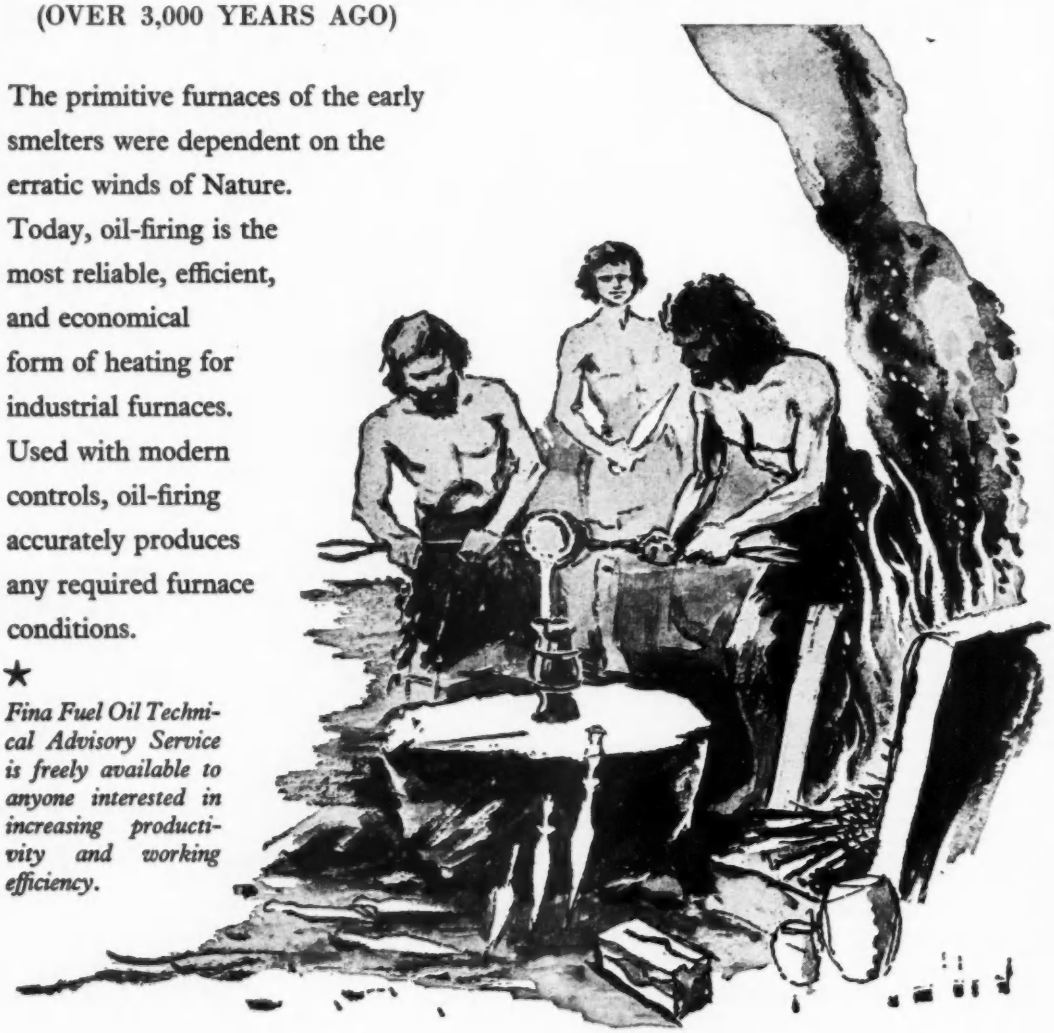

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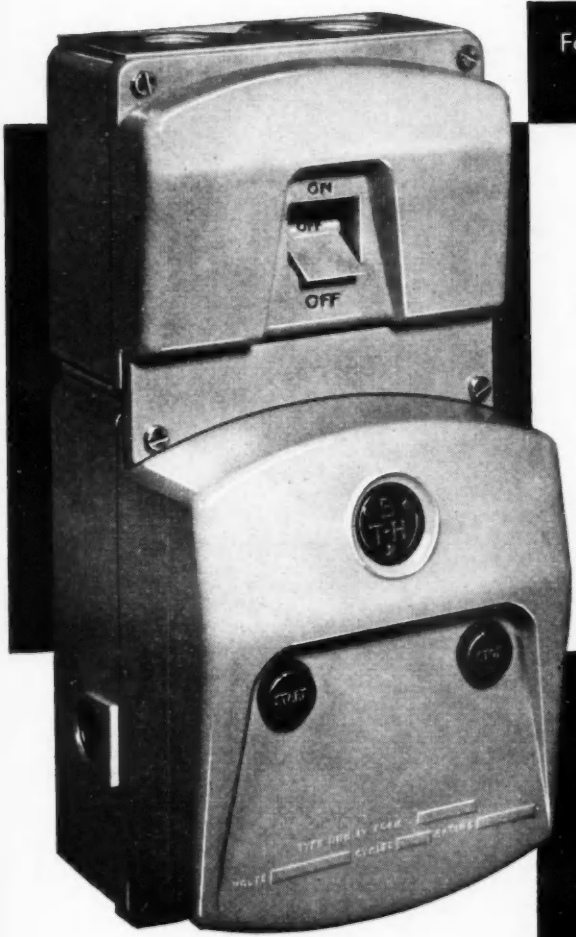
For three-phase or single-phase non-reversing squirrel-cage induction motors.



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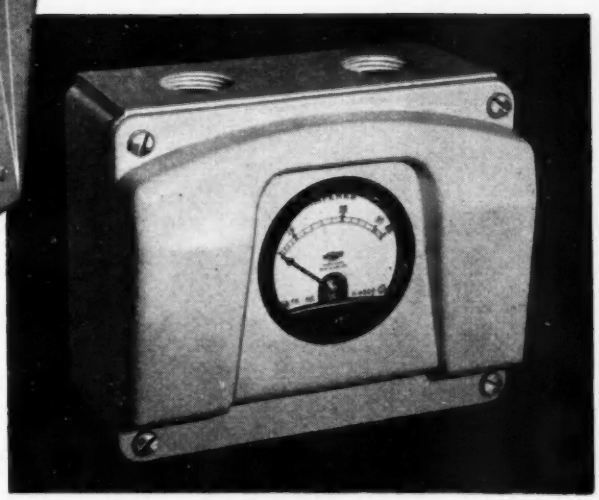
The isolating switch can be supplied as a 3-pole 'on-load' switch rated at 30 amperes maximum (tested to break 100 amp. at 440 v.), or alternatively in 5-pole form with three main 30-amp. poles plus two normally open control-circuit auxiliary poles.

The starters comply in every respect with BS587, 1957 for 'Frequent Duty', i.e. forty starts per hour.



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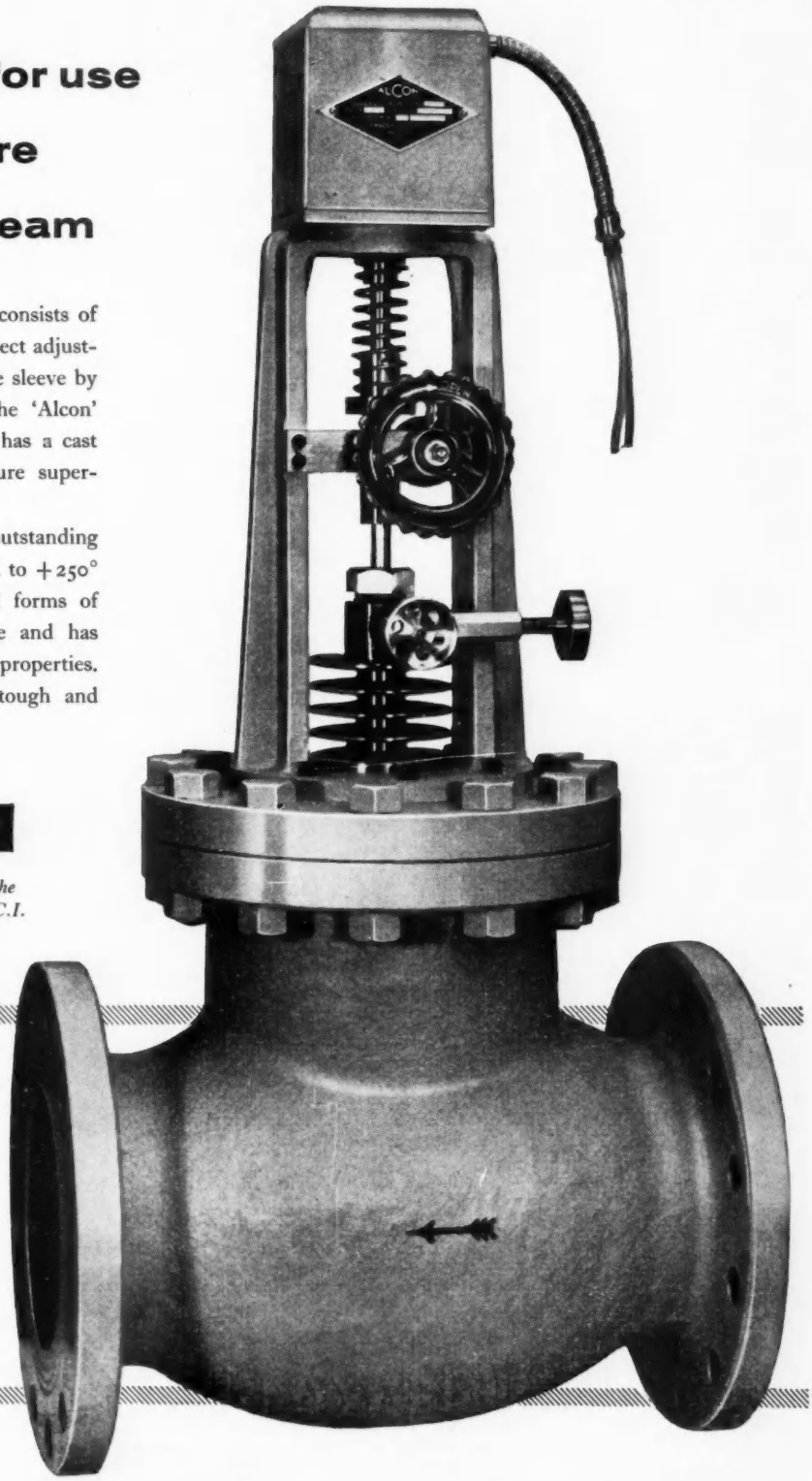
'Fluon' in valve for use on high pressure superheated steam

The gland on the valve illustrated consists of 'Fluon' p.t.f.e. chevrons held in correct adjustment by a cylindrical gland pressure sleeve by means of shims .005 in. thick. The 'Alcon' Type ACHW.15 hand reset valve has a cast steel body for use on high pressure superheated steam.

A great feature of 'Fluon' is its outstanding working temperature range (—80°C. to +250° C.). It is virtually immune to all forms of chemical attack. 'Fluon' is flexible and has excellent non-wetting and non-stick properties. It is, furthermore, an extremely tough and long lasting material.

'FLUON'

'Fluon' is the registered trade mark for the polytetrafluoroethylene manufactured by I.C.I.



The gland on this 'Alcon' Type ACHW.15 hand reset valve made by Alexander Controls Ltd. contains chevrons made from 'Fluon' p.t.f.e by The Dunlop Rubber Co. Ltd. (General Rubber Goods Division) Cambridge Street, Manchester 1.

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armoured or composite
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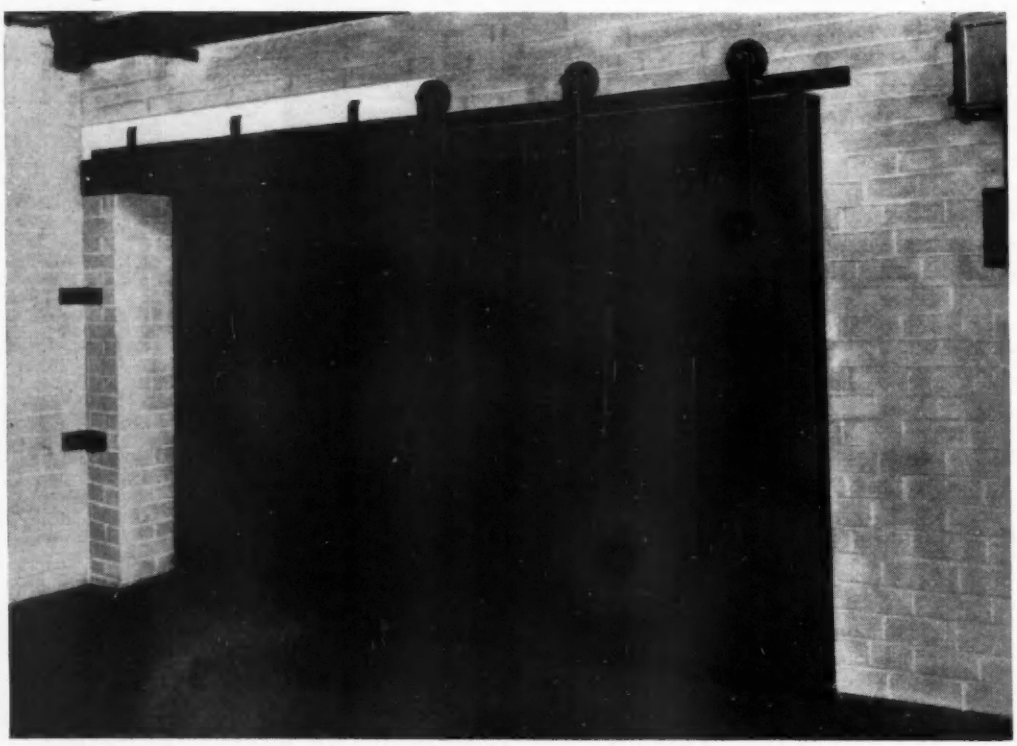

Mather & Platt non-automatic sliding armoured fire doors installed in a willey-room in a Yorkshire woollen mill

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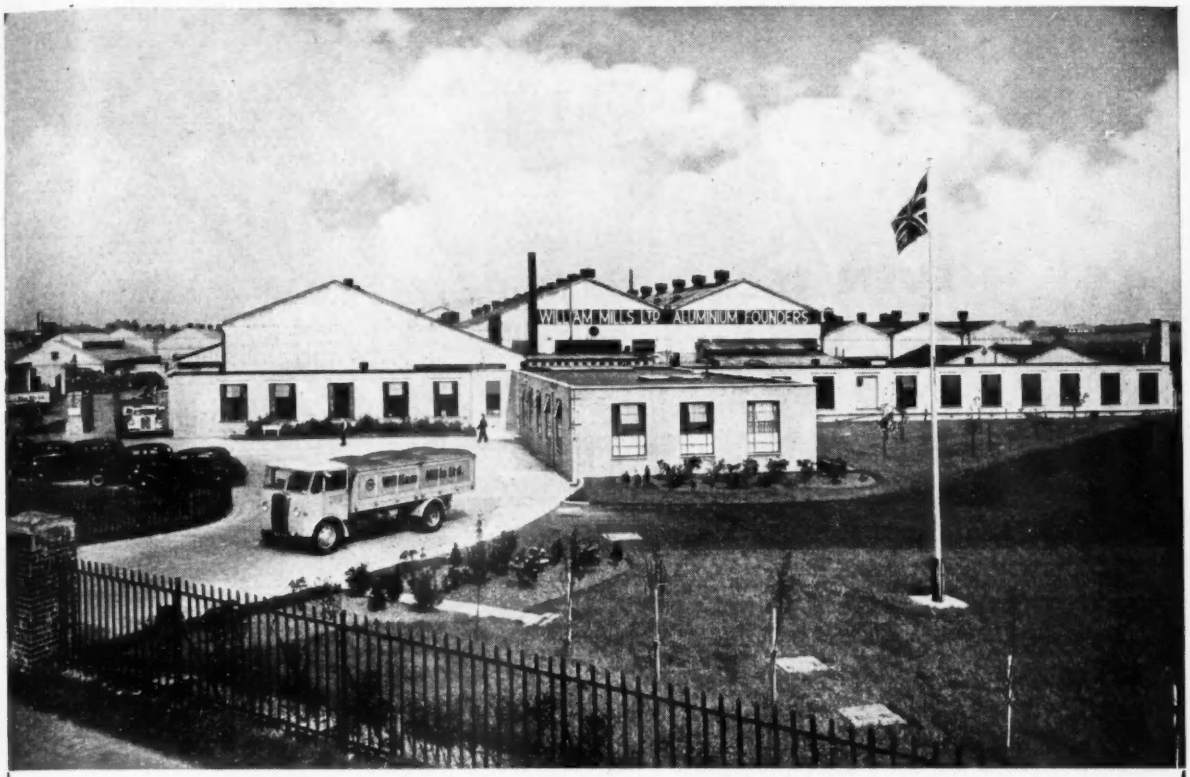

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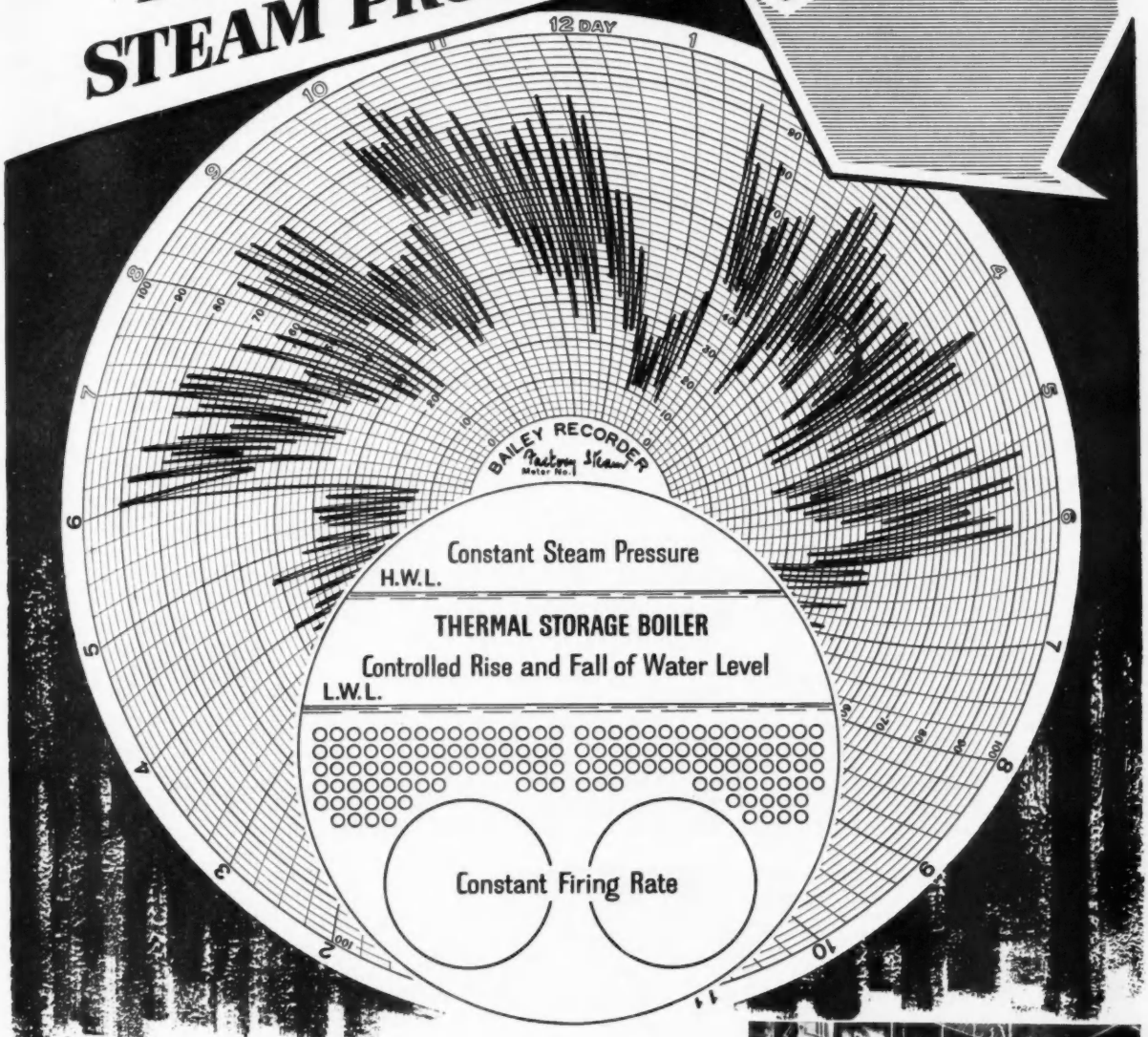

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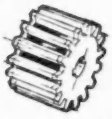
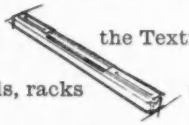
Tufnol is a remarkable material produced  from Cotton Fabrics.
Many components in  the Textile Industry give far better service when made of Tufnol.
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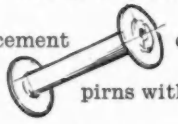
minimum of vibration; raceboards save replacement  costs; dye jig bearings
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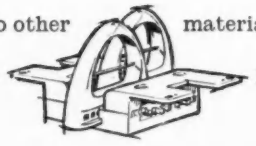
wheels save wear on floors; pulleys and rollers are "kind" to other  materials.
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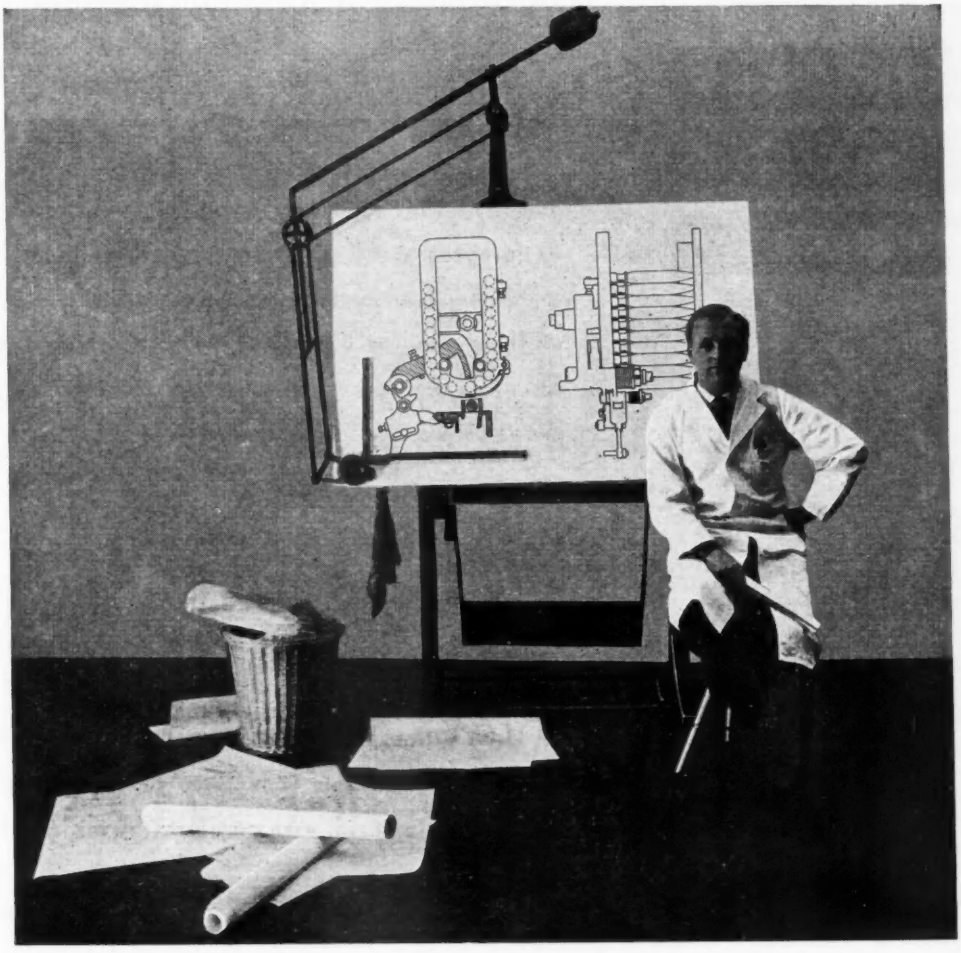

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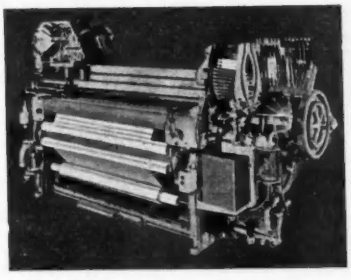

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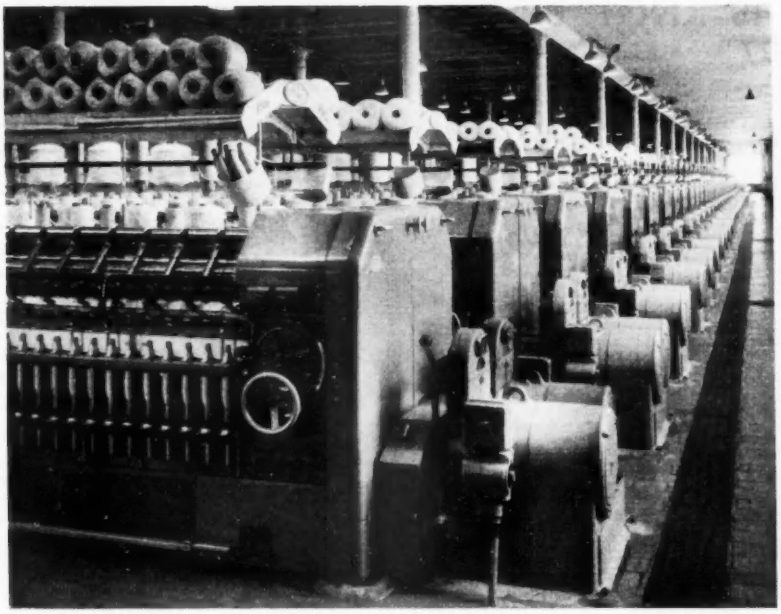

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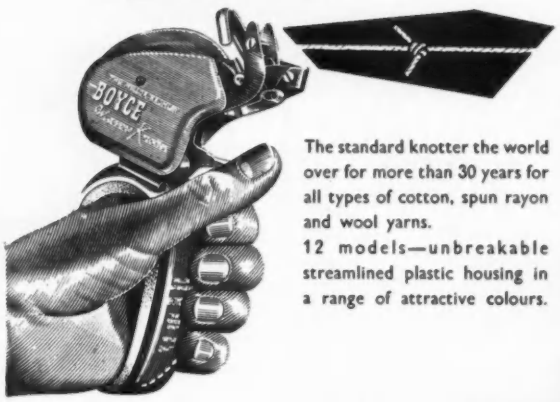

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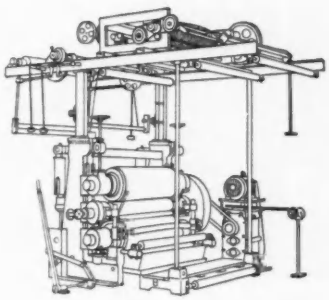
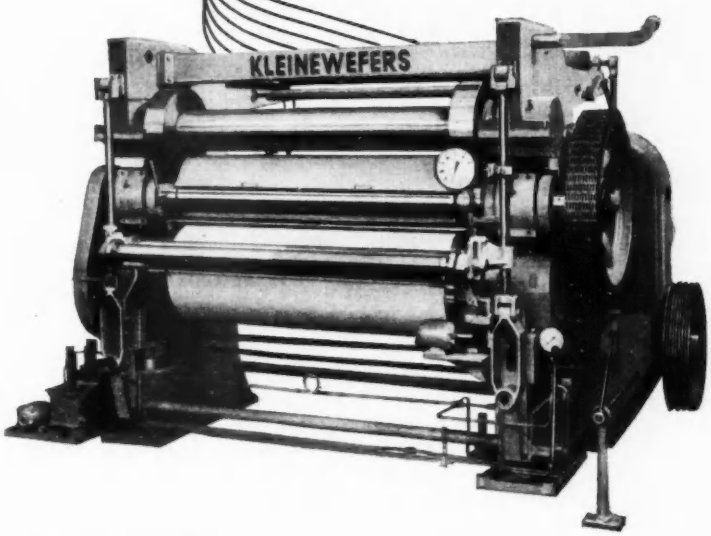


Water Mangle in a Bleaching Plant



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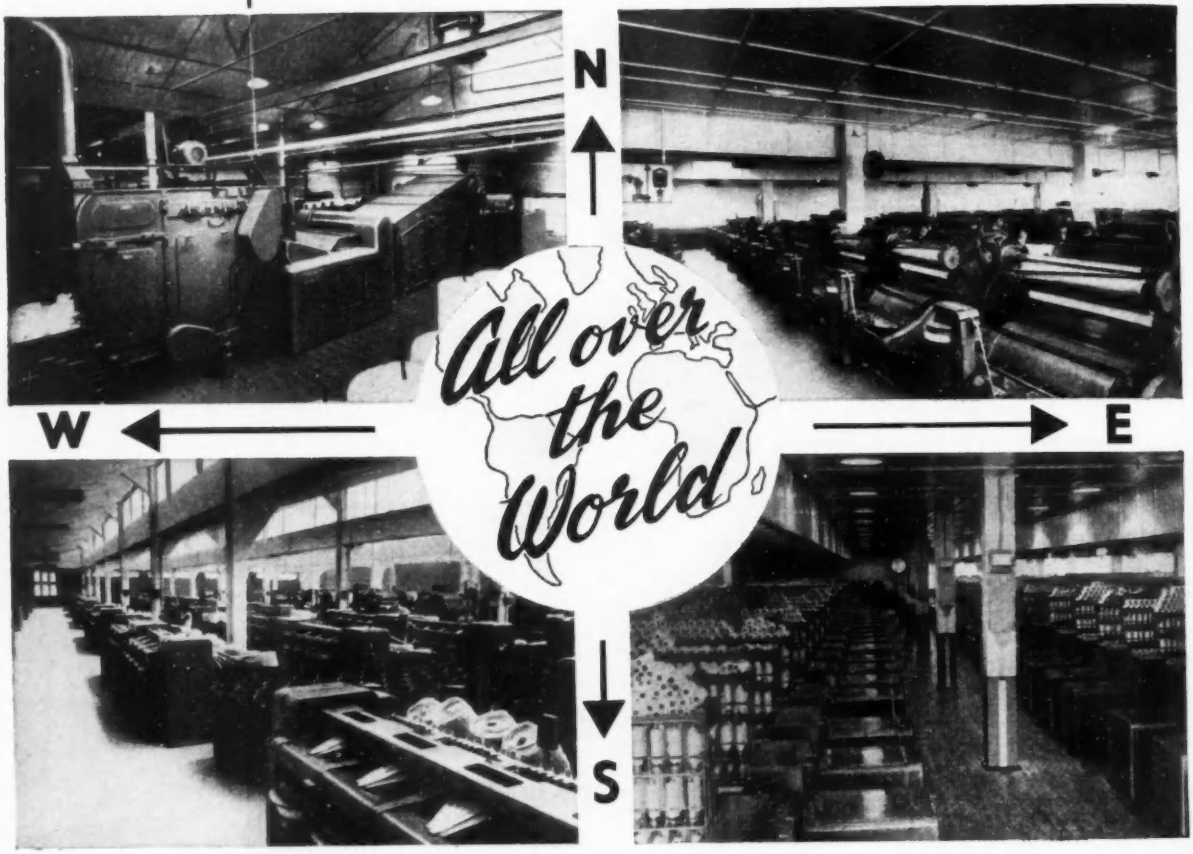

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MATERIALS - PROCESSES - PRODUCTION - MANAGEMENT

NO. 1007. VOL. 84 - NOVEMBER 1958 - MONTHLY Two Shillings and Sixpence

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THE TEXTILE MANUFACTURER (*Incorporating* TEXTILE INDUSTRY AND EXPORTER, THE TEXTILE MACHINIST, THE HOSIERY, LACE AND SILK MANUFACTURER, *and* THE TEXTILE COLOURIST) is published on the first Monday of every month.

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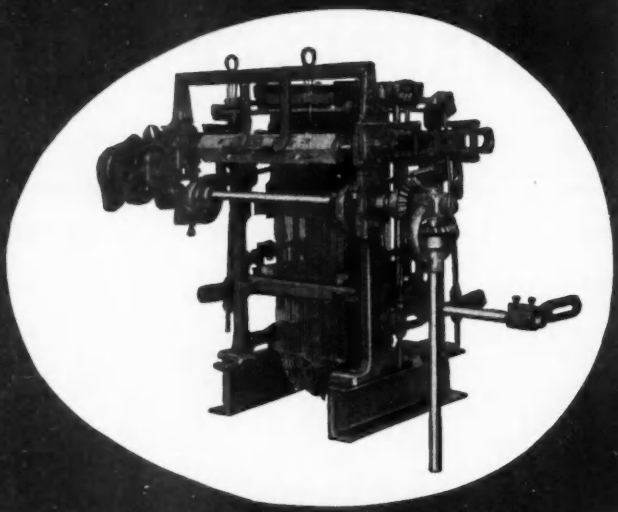

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THE TEXTILE MANUFACTURER

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Notes of the Month

EGYPTIAN COTTON

One of the most unexpected changes in the world's cotton situation since the second world war is the completely different pattern of Egypt's foreign trade in raw cotton. For many decades almost the whole of Egypt's raw cotton exports were absorbed by a few countries in the western world. These countries, led by the United Kingdom, were among the oldest cotton industrial countries and were, by tradition, spinners of long and extra-long staple cottons. Today, however, the situation is totally changed. The traditional customers buy only a fraction of the crop, but more than 60% of the total cotton exports from Egypt go to Soviet Russia, China and countries in Eastern Europe.

There are two reasons for this change. Certain political developments on the international scene had an influence on the foreign trade policy of Egypt in general and on its foreign exchange position and that of some of its traditional customers in particular. However, the more important reason is the fact that today Egypt no longer has the virtual monopoly in long staple cottons it previously enjoyed. This fact is often overlooked when Egypt's cotton export potential is assessed. The change in the foreign trade pattern could and would not have taken place if it had not been possible for the traditional customers for Egypt's cotton to supply themselves with similar qualities elsewhere. One must also bear in mind that the substitution of Egyptian cotton by other growths had already begun before the Suez crisis and was merely accelerated by the events which followed thereon.

What conclusion may be drawn from this fact? Today, it is of vital importance for Egyptian cotton to be more competitive than ever. Spinners throughout the world still consider Egyptian cotton as being one of the finest growths available, especially in its longer varieties; all those who used to process Egyptian cotton in their mills would like to continue to do so. But today a sale will no longer be made on considerations of quality and staple length alone. Price, relative stability of prices, the absence of arbitrary interference with price formation and regularity in supplies are equally important factors. Every cotton exporter must be able to satisfy his prospective customers on all these points, if he wants to make a sale.

It is no doubt possible to maintain or increase the cotton export volume by barter deals, bilateral transactions or other measures of foreign economic policy. But in the long run Egypt's cotton exports will depend on those spinners who really want and need Egyptian cotton, who are qualified and equipped to process it and who are able to manufacture those types of exclusive textiles for which Egyptian cotton is the most suitable fibre.

It is therefore to be hoped that trade relations between Egypt and the traditional customers for its cotton will be resumed and strengthened at an early date. This may best be achieved by offering Egyptian cotton on world markets on purely commercial considerations. A competitive price, relative price stability and reasonable assurance of regularity of supplies will be decisive factors. With regard to quality, Egyptian cotton has always had a good record. The most urgent problem in this respect is perhaps the complete elimination of black specks. Buyers of Egyptian cotton also have the advantage of the use of the Egyptian Testing House at Alexandria and the new spinning test laboratory at Smouha. Plans are now being made to reconstitute the Joint Egyptian Cotton Committee within the International Federation of Cotton and Allied Textile Industries, in order to provide an independent forum for the discussion of any commercial or technical aspects of Egyptian cotton. This Committee, incidentally, has been a powerful agent for the promotion of Egyptian cotton in the past. Another effective way of promoting exports of Egyptian cotton has been the financial assistance given by certain textile sales promotion campaigns in some of the leading consumer markets in Europe.

It is true that the position of Egyptian cotton in world trade does not only depend on Egypt; it depends in great measure on the world cotton situation in general, and on the policies adopted by the largest producing and exporting country of the world, the United States of America. In this respect it may be interesting to recall that only recently, at its last annual meeting held at Stockholm on August 28, 1958, the International Federation of Cotton and Allied Textile Industries unanimously adopted a "Statement on Raw Cotton Policy," which was later submitted to the Secretary of Agriculture of the United States Government. In this statement the Federation reiterated that the continuance of any cotton marketing policy, even for a limited time, under which export selling prices can be arbitrarily changed at any time with or without notice, is detrimental to the free flow of cotton into consumption areas. It undermines confidence in forward buying and prevents traders throughout the world from reaching long-term dispositions regarding the importation and consumption of cotton and cotton goods.

Moreover, such policy renders it most difficult for futures markets to provide the traditional cover against price fluctuations. Unless there is a return at an early date to a one-price system and free marketing, the cotton futures markets in importing countries will cease to function, to the great detriment of the cotton merchanting and consuming world.

Therefore, in order to restore confidence in cotton and further to encourage a world-wide increase in consumption of cotton, the Federation urged the United States raw cotton industry, the administrative and legislative branches of Government to continue their efforts to eliminate the two-price system as soon as possible. With regard to the raw cotton trade in general, the statement stressed that "sudden arbitrary changes in export selling prices, changes in export taxes and abrupt alterations in rates of exchange in other producing countries also contribute to the prevailing uncertainty in the cotton consuming world. The Federation desires to impress upon the cotton interest groups and the Governments of these countries the widespread consequences of such actions and most emphatically urges upon them the necessity of adopting such policies as will remove these uncertainties."

What then should be done in order to satisfy the mutual interests of the growers, exporters, spinners and manufacturers of Egyptian cotton? The aim should be to return to a complete normalisation of trade relations with all cotton consuming countries and to supply Egyptian cotton at a truly competitive price, to be formed in an open market, free from arbitrary interference with the laws of supply and demand. If these conditions are fulfilled, then the demand for Egyptian cotton will spring up again where it has fallen away and will increase elsewhere. Egypt will then again be able to serve its customers, old and new, who by the nature of their production would spin Egyptian cotton in preference to any other.

(With acknowledgments to the International Federation of Cotton and Allied Textile Industries, also the Egyptian Cotton Gazette, Alexandria, No. 35)

HUMAN PROBLEMS IN INDUSTRY

Industry, universities and technical colleges should do more in the field of human sciences, says the joint D.S.I.R. —Medical Research Council Committee on Human Relations in Industry in its final report (H.M. Stationery Office, price 3s. net) but, it warns, there is no easy way to gear this type of social research to industrial needs. It must be a joint effort on the part of industry, which has the responsibility of developing applied research in this field, and of the universities and technical colleges, which must also train an increasing number of scientists to carry out such researches. The first essential for the fundamental development of the sciences is adequate career prospects in research organisations as well as in industry. The impartiality and independence of the research workers must be beyond question. Of government's responsibility, the committee says: "Financial support for social research programmes should have more continuity than in the past . . . the time has come for a settled policy of support and for the end of *ad hoc* administrative arrangements." The Department of Scientific and Industrial Research has set up a permanent human sciences committee to carry on work in this field, which was started so successfully by the two former committees (the D.S.I.R. - M.R.C. joint committees on human relations in industry and on individual efficiency in industry).

Dealing with the problems of policy, the joint committee on human relations in industry, deals extensively with such questions as practical significance, communication of research results, future growth and balance of applied and fundamental research. Here are some of the things they say:—

On the role of the social scientist in industry: Compared with some other countries, particularly the United States, Britain is fortunate in that social research workers have been able to maintain the impartiality and independence of their scientific role. None the less, some difficulties need to be clarified and some misconceptions dispelled. Their work should not be biased by the aims of one group or another—the results should be equally available to all.

On productivity: Social research work in industry should satisfy other than purely economic needs and human relations are important in their own right. But it is desirable that productivity should be an important object of study and that the results of human relations research should be applied to that end.

On industry: Unfortunately, recognition of the usefulness of social research is still found in only a small though rapidly growing group of people in industry. Most important of all, more of the larger industrial firms should be experimenting with research and the developments of research teams in this field.

On the shortage of trained people: This is the main obstacle to the healthy growth of social research in industry. In fact, this deficiency is a crucial factor—no real progress is possible without more trained workers.

On future public support: A main aim should be to create a number of stable research groups of viable size. This will require a higher ratio of senior to junior staff to reduce the present vulnerability to the departure of key people and to provide adequate supervision of junior research workers. It would also provide the best answer to the training problem and career prospects.

The joint committee on individual efficiency in industry 1953 - 57 also presents its report in the same publication. Training methods presented an important problem as the committee found that in this country "there must be few instances in which scientific validation of a training procedure—'quality control' of training—is being attempted."

The inefficiency of the traditional method of training—to learn by observation and example—is notorious yet, in a recent survey by the European Productivity Agency, considerable difficulty was reported in locating in the U.K. an adequate number of firms with training schemes worthy of comparison with those found in some other countries. The report includes summaries of two of the committee's research projects dealing with 15-year-old learners. The results show that the performance of girls completing organised training considerably exceeded management's expectation, or previous experience of a school leaver's capacity in output, quality and scope. Yet the traditional method prevails today.

The committee supported four projects which demonstrate the possibilities of improved training methods. Of this problem they say: "Those responsible in industry would do well to consider carefully the great advantages of systematic training of operatives." Designers still too often overlook the physical and mental characteristics of the people who will use the equipment they design.

Sack Cutting, Sewing and Printing

The major portion of the total bag and sack output is still made from broad loom cloth, cut and doubled to the appropriate size and subsequently sewn up one or both sides as well as the bottom, with hemming at the top

By S. A. G. CALDWELL, F.T.I.

TWO factors which enabled jute to attain and maintain its lead as the principal packaging material for merchandise in transport and storage, and for extending its application to other uses were cheapness and adaptability. While the wide range of end products now being made ensure a sustained outlet for jute manufactures—at a price—the high cost of raw material, which is approximately six times the pre-war average, threatens to price it out of its main market for packaging despite economies effected in manufacture and conversion.

The first consideration in determining the appropriate type of package cover to be used for a specific purpose is its serviceability. As it is merely a necessary incidental to the article or material to be conveyed price is the second most important factor. The steep upward trend of manufactured jute prices in recent years has stimulated interest in the use of paper, plastic film and other competitive materials, while alternative means of handling—including bulk transport of grain and other goods in large containers—has curtailed demand for jute bags. Nevertheless, production of these is still substantial, annual output of new jute bags in Gt. Britain exceeding 200 million, of which approximately 75% are hessian.

In a highly competitive market demand can only be sustained by an intimate knowledge of user requirements, together with a willingness to adopt and adapt in order to meet these. This is evidenced by recent developments in chemical processing to increase serviceability, and by the introduction of paper-lined jute bags for transport of fine powders. The paper and fabric is usually bonded with bitumen which also effects a measure of waterproofing. This property can be further improved by using double paper linings with a suitable waterproof adhesive.

In addition to ability to compete on a price basis the range of end products and market for them are defined by serviceability. This depends, of course, partly on fibre characteristics and in large measure on appropriate manufacturing methods, in particular, finishing treatments to enhance the applications of the material for a specific end use. Some of these have been described in previous articles in this series which dealt with cloth finishing treatments.

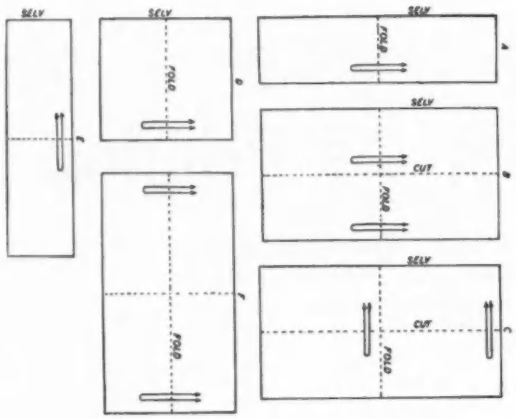
Material Specifications

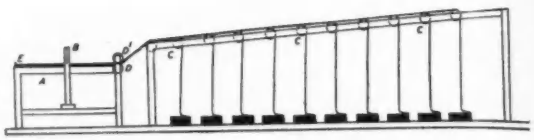
A considerable amount of broad loom hessian in the finished state is used for bale covering and for other purposes, being cut from the web as required and hand sewn, strapped or corded to retain it in position. Where circumstance and conditions permit, however, coverings are prefabricated; the bulk of jute fabrics being made into bags and sacks. Specifications of materials employed for this purpose vary with end requirements. In the case of bags and sacks these may require freedom from any constituent in the batching emulsion, warp dressing or finishing treatment which might contaminate the contents of the package. In addition to fabric weight, weave and closeness of structure they may include details of treatments required—rot proofing, water proofing, etc.—to ensure serviceability. While the terms "bag" and "sack" are frequently used synonymously with reference to this form of container the first mentioned denominates the lighter weights made from plain woven fabrics including hessian and tarpaulin. The heavier twilled sacking is used for the production of sacks.

The appropriate fabric specification and size of bag or sack for any purpose has generally been determined by usage. The extensive range in production and the diversity of structure indicate that no measure of standardisation is possible. The following list, which is by no means exhaustive, gives some idea of the diversity in structure, size and end purpose:—

Australian Corn Sacks. 41 ins. long by 23 ins. broad. Weight 2¼ lbs. 8 porter. 9 shots. Twill.
Australian Wool Packs. Hemmed bag with attached top. 54 ins. long, 27 ins. broad, 27 ins. deep. Weight 11½ lbs. 8 porter. 9 shots.
Coffee Twill Bags. 40 ins. long, 28 ins. broad. Weight 2½ to 3½ lbs., according to structure. 7 porter. 9 shots.
Cuban Sugar Bags. 48 ins. long by 29 ins. broad. Weight 2½ lbs. Twill weave. 8 porter. 9 shots.
C Bags (Light). 40 ins. long by 28 ins. broad. Weight 2 lbs. 8 porter, 8 shots or 7 porter, 9 shots.
Cocoa Sacks. 45 ins. long by 30 ins. broad. Weight 4 lbs. 10 porter. 12 shots.
Egyptian Grain Sacks. 60 ins. long by 30 ins. broad. Weight 3½ lbs. 6 porter. 8 shots.
Egyptian Sugar Sacks. 48 ins. long by 28 ins. broad. Weight 2½ lbs. 6 porter. 8 shots.
Liverpool Twills. 44 ins. long by 26½ ins. broad. Weight 2½ lbs.
New Zealand Corn Sacks. 48 ins. long by 26½ ins. broad. Weight 2⅞ lbs. 8 porter. 9 shots.
Onion Pockets. 40 ins. long by 22½ ins. broad. Weight 12 ozs. 9 porter. 10 shots.
Salt Sacks. 45 ins. long by 26 ins. broad. Weight 1¾ lbs. 6 porter. 8 shots.
Sand Bags. 33 ins. by 14 ins. Weight 9 ozs. 9 porter. 10 shots.
Twill Corn Sacks. 44 ins. long by 26½ ins. broad. Weight 2⅞ lbs. 9 porter. 9 shots.

While the development of the circular loom for jute weaving has effected a substantial saving in the cost of bag making, the tubular cloth requiring only to be cut into appropriate lengths which are sewn at the bottom and hemmed at the top, by far





(Above)
Fig. 2. Sectional elevation through hand-operated cutting machine

(left)
Fig. 1. Six methods of cutting and folding from four different widths of broadloom fabric

the major portion of the total bag and sack output is still made from broad loom cloth which must be cut and doubled to the appropriate size, being subsequently sewn up one or both sides as well as at the bottom, and hemmed at the top.

While the operations incidental to converting broad loom fabrics into finished bags include cutting, folding, sewing and printing, the sequence of these may vary with the machines installed for the purpose. With emphasis on economy in manufacturing cost there is a growing tendency to combine various operations on one machine, nevertheless the general practice still is to use a separate machine for each operation. The method of cutting and folding is determined by user requirements, fabric width, and the size of bag to be made. As it also determines the amount of sewing it has an important bearing on cost of production. Frequently sacks are specified to be sewn up two sides and hemmed at the mouth, while the lighter hessian bag is usually sewn on one side and the bottom, being also hemmed at the mouth, or, if the selvedge is at the mouth hemming may be dispensed with.

The bearing of fabric width and method of cutting on production cost is evidenced by studying the diagrams in Fig. 1, which illustrate six methods of cutting and folding from four different widths of broad loom fabric. A makes use of a narrow width fabric, equal to the finished width of the bag, plus allowance for sewing edges, the overall length of cloth required being double the sack length plus twice the turn in for the mouth hem.

In B cutting is done from a fabric width double that of the bag, plus the necessary allowance for sewing edges of which there are four. In this instance cutting is done warp way and folding weft way, each bag being sewn up both sides as in A. In C cutting is done from the same width of fabric as used for B. In this instance folding is effected warp way and cutting weft way. Sewing is required across the bottom and up one side, the top edges being hemmed. The method of cutting and folding shown at D requires a fabric the width of which is equal to that of the bag length plus sewing requirements at bottom and hemming at the mouth. The length of cut must include sewing requirements for one side.

The width of fabric required for method E is equal to double the bag length plus, if necessary, double the turn in for hemming at the mouth. The length cut must allow for sewing requirements up both sides. The fabric used for E can also be made up as indicated at F, provided selvedge hems at the mouth are dispensed with, the extra width allowance for this at E being taken up by sewing requirements at the bottom of the bag. Cutting is warp way with sewing up one side and across the bottom.

Cutting

From the weavers' viewpoint the merits and demerits relative to the use of the narrow and broad fabrics required by these methods of cutting and making up tend to cancel out. Loom output is determined by the rate of shotting, but as this is not inversely proportional to fabric width, the material required per bag is produced more cheaply in the double width fabric, as at B, C, E, and F than at A and D. This is partly offset by the higher capital cost of the broad loom together with the greater power consumption. Detailed cost analysis, however, indicates production from wide fabrics to be most economical.

Cutting may be done by hand- or power-operated machines, the latter having now largely superseded the former. Hand machines are still used for cutting sizes not conveniently handled on the power-driven units, and also for cutting light open fabrics. A sectional elevation of a hand-operated machine is shown in Fig. 2. This is capable of cutting up to ten thicknesses of fabric simultaneously. It comprises a cutting table A on which the guillotine blade B is mounted, the position of the latter being adjustable to the requirements of the sack to be made. The webs to be cut may be mounted on pins which are supported on a rack, or made up in bolts or fakes which are set on the floor behind the machine as shown. The end of each fabric is drawn over a guide roller C, the combined total passing through the draw rollers D D^1 at the back of the table, under the knife to the adjustable stops E, by which the length to be cut is determined.

Power-operated machines are used extensively for this purpose. The Harnden C3 high speed unit, shown in Fig. 3, which is supplied by T. C. Keay Ltd., Dundee, combines the merits of a high rate of production with easy adjustment to any length of cut between 3 ins. and 120 ins. A two-speed gear is incorporated, the higher speed for use on short and the low speed on long lengths. The machine can be arranged for motor or belt drive. The material for cutting can be in the form of rolls or fakes. The output per hour with continuous running on ten thicknesses is 8,100 for 3 to 50 ins. length of cut, and 4,900 between 50 and 120 ins.

Various forms of seam are used for making up, the appropriate one for any purpose depending on the type of fabric, the type of container, and on end use requirements. In the plain seam shown at A, Fig. 4, the material is folded the two edges being brought level and sewn up, the finished bag is

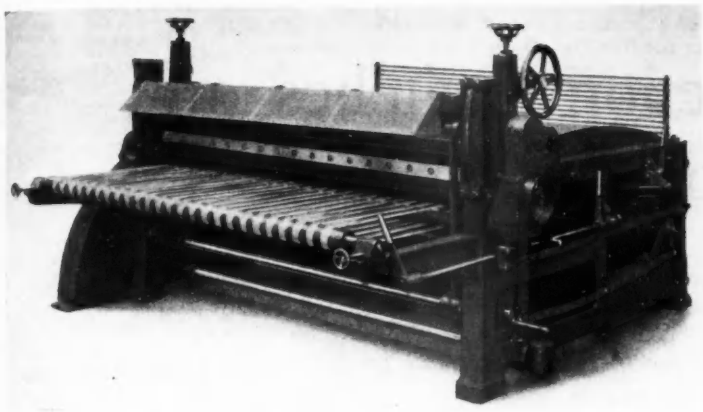


Fig. 3. The "Harnden" type C3 high speed sheet cutting machine

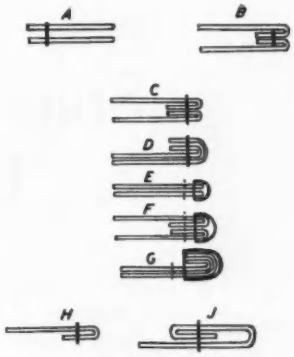


Fig. 4. Various types of seam used in making-up

turned so that the edges are inside, as indicated at B. If required a double line of stitching may be used to improve the strength factor. In the "M" seam shown at C, the edges are turned in so that the sewing is through four thicknesses of fabric. The bags do not require to be turned after sewing. In the fold-over seam shown at D the sewing is also through four thicknesses and the bag does not require to be turned.

Various forms of overedge seam are also used, as indicated at E, F and G. In each instance the bag is used without turning. A safety seam may also be inserted, as indicated by the dotted line. The two forms of hem in common use for sack mouths are shown at H and J, Fig. 4. When the selvedge is at the mouth the cloth is usually turned once and sewn through two thicknesses as at H. When a cut edge is at the mouth it is usually turned twice prior to sewing, as at J, Fig. 4.

Four different forms of stitch are in general use in bag and sack making. The chain stitch is used extensively in bag making, three to five stitches per inch as required. This form of seam has good extensibility but tends to open up if a stitch breaks. The lock stitch combines the merits of strength with considerable resistance to opening in the event of a thread cutting or breaking. It is, however, inelastic and the machines have a relatively low output. The overedge stitch generally used for heavy sacks ensures a very strong seam but the rate of output is slow, not exceeding 500 stitches per minute. The Herakles overedge stitch combined high seam strength with considerably higher output in the region of 1,800 stitches/min.

Printing

Printing is an important part of the finishing treatment in bag and sack production. This may include the user's name and some details of contents, with also a brand or trade mark, the whole in one or more colours. Printing may be done prior or subsequent to making up—usually the latter. The machines employed are mostly of the rotary type, having one or more cylinders on which the lettering and design, previously cut out on a canvas-backed rubber base, or other suitable medium, is mounted. The printing ink or colour is contained in a colour box, and is transferred to the cylinder by the colour roller, which is partly immersed in the colour box. The amount of colour deposited on the cylinder is determined by the spacing of the doctor knife in relation to the surface of the colour roller. The bags to be printed are fed into the machine singly on a feed sheet on which they are conveyed under the printing cylinder. Firm contact with the latter is ensured during printing by means of a rubber-covered pressing roller set under the feed sheet and immediately below the cylinder. When more than two colours are to be printed, and when printing on both sides is required the necessary mechanism is incorporated in the machine. Fig. 5 shows a 2/1 Sphinx machine for printing two colours on one side of the bag and one colour on the reverse side. This is made and supplied by T. C. Keay Ltd., Dundee, who manufacture a range of printing machines for bag and sack printing.

The ink or colouring substance uses a drying oil, such as boiled linseed, as a base. The required pigments and appropriate driers are mixed with this, together with a solvent which acts as a thinner. Various liquids, including paraffin and turpentine, are used for this purpose, selection being determined partly by end use requirements to avoid contamination of the bag contents. The rate of output varies to some extent with the amount of printing required. With modern machines on ordinary work this is in the region of 7,500 bags per machine per day. On removal from the machine they are made up into bundles of 25 or 50 for dispatch.

Processing practice in the production of bags from tubular fabrics does not differ materially from that for making up open width materials, except for the saving in folding and sewing. The chief merit of the tubular bag, additional to its lower cost of production is in its high resistance to bursting when dropped or when under weight in the stack.

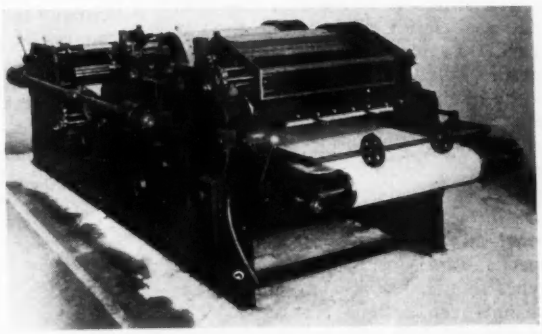


Fig. 5. View of Sphinx 2/1 colour printer

Snap Action Switches on Textile Machinery

The designs of snap-action vary mainly with requirements, whether for use as a safety device, a limit switch or as a controlling device. Success or failure depends on correct selection for the work they have to do

By L. WALTER, A.M.I.PLANT.E.

DEVELOPMENTS in new automatic textile machines bring in their stride extensive uses of electrical switches and new hand-operated types have been developed for facilitating push-button control. Even more noticeable, however, has been the design of automatic switches and the user of modern textile machines should be familiar with the characteristics of these specialities. Failure of one of these small useful gadgets might easily endanger production by causing idle machine time and to understand how automatic switches are designed together with their specialised functions is an important part of machine maintenance.

The mechanical snap-action electrical switching gadgets commonly called micro-switches find wide general industrial application as safety devices, or as limit switches in conjunction with two-step (on/off) control action, or as attachments to measuring instruments for signalling purposes. The practical use of switch mechanisms will be dealt with in this survey and those design details described which influence correct choice of type and location.

Types of Snap-action Switches

The purpose of any type of snap-action switch is to make or break an electrical circuit. This can be done by a mill operator either manually, i.e. by pushing a button by hand, or mechanically by using a moving machine part for actuating a switch. Movement of an automatic control element for example, a flexible bellows or membrane, as widely incorporated in pressurestats and thermostats is another method of using a snap switch mechanism. Most of the micro-switch types in practical use are single pole change-over designs for up to 300 operations per minute at capacities

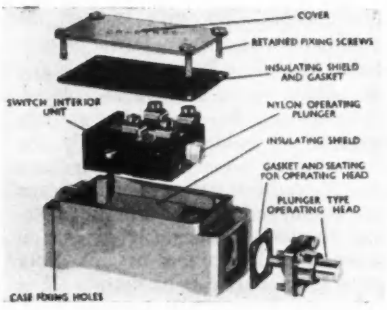


Fig. 1. Exploded view of limit switch (courtesy, J. A. Crabtree and Co. Ltd., Walsall)

ranging from 2A 600 V a.c. to 5A 250 V a.c. Modern snap-action switches are proof against normal dust, moisture and vibration conditions, and are housed either in plastic or metal cases. The contacts are usually of fine silver, and over-travel of the spring is limited, thus producing little wear (see Figs. 1 and 1A).

All designs of precision switches have been worked out for the purpose of making a mechanical motion produce an electrical impulse which later can be made to control almost any kind of action. For example, an electric or electronic switch can be used as a substitute for the eyes and the sense of touch of a mill operator. Automatic action of electric motors, solenoids, of pneumatically or hydraulically operated valves or dampers can be introduced faster and with greater reliability than when depending on the human element. The great variety of uses of automatic precision switches has demanded various shapes of switches, especially of the snap-action type and compactness combined with high capacity for electrical load was aimed at. Combined with this was the demand for freedom from sparking or arcing, and for small push or pull force in conjunction with inherent stability. For example, a thumb-size switch with an electrical rating of 5 A up to 250 V a.c. can be operated by a movement of the actuating level extremity of 0·38 in. Most actuator designs provide for a prescribed amount of over-travel which is required for many uses.

Various Functions

Basically, snap-action switches are used in practice to function as (*a*) limit switches, (*b*) control switches, and (*c*) safety switches. As the name implies, a limit switch usually breaks an electric circuit when a moving object reaches a desired position. A control switch makes or breaks a contact in order to produce some action, usually in the form of sequence control. Safety operations are used as safeguards, or provide interlocking.

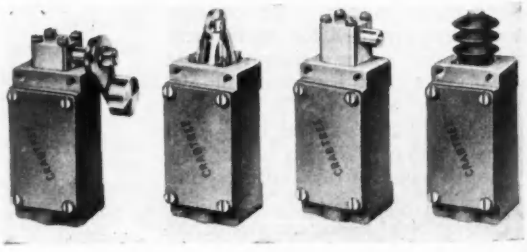


Fig. 1A. Various types of snap-action switches

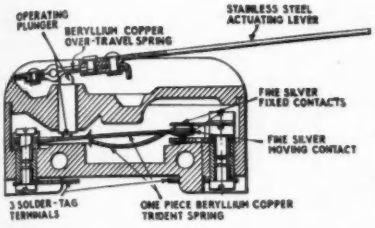


Fig. 2. Sectional view of switch (courtesy, Burgess Products Co. Ltd.)

Usually the moving force in a snap-action switch acting on the plunger depresses a cantilever member of a spring (see Fig. 2). At a certain point in the downward travel of the plunger, the opposing force of the spring is overcome and the latter snaps over, carrying a movable contact to a fixed contact. The actual amount of travel must be in excess of the movement differential of the switch mechanism. Rapid snap action reduces arcing and is an important factor in the life of a switch. The amount of force available to actuate the switch will determine to a limited extent, the choice of actuator design. What is required from an efficient design is repeat accuracy, a long probable mechanical life governed by characteristics of the spring, and a long contact life. In general a choice of three circuits is available, namely, double-throw, single-throw normally closed, or single-throw normally open.

Correct Choice of Switch Type

The success or failure of snap-action switch applications depends on the correct choice of the type and on efficient installation. Both are an art which has to be acquired by the potential user of precision switches, usually by studying sales literature supplied by the makers and by discussion of the actual problem with specialised engineers. Mistakes are sometimes made when taking a switch from the storage shelf without much thought, and installing it.

The choice of switch type depends on whether inductive or non-inductive loads have to be dealt with, on permissible temperature rise in the current-carrying parts, on line voltage, number of contacts, and on general working conditions. Single-pole double-throw switches have three contacts per circuit, or pole, one being movable for alternatively making the other two fixed contacts. In its free position the actuating trip has no operating force to withstand. The release position of the actuating trip is reached after the actual operation. The difference between operating and release position is called "movement-differential" (see Fig. 3).

As mentioned before, the designs of snap-action switches vary mainly according to the requirement, whether for use as a safety device, a limit switch or a controlling organ. For example, a robust industrial switch has a neoprene plunger cowl which is dust- and splash-proof, with fully sealed terminals, and ample over-travel. Another type has a switch housing with roller attachment, and is used for many applications. An interrupter type for cam and sliding-dog actuation is available where movement

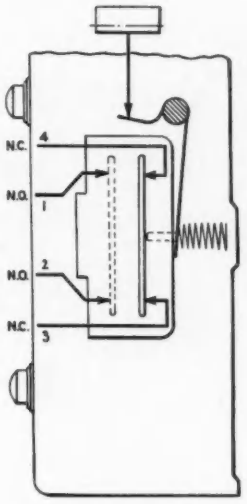


Fig. 4. 2-circuit, double break precision micro switch with sealed head (courtesy, Honeywell Controls Ltd.)

is applied in any direction. Where dust or grit might endanger the operating ball, either installation upside-down, or encasing in a dust-proof housing is recommended.

In industrial practice it can be safely stated, the use of these inexpensive devices could with advantage be greatly increased for safety reasons. Many an accident in factories could

Fig. 3 (left). Outside view of Igranic snap-action limit switch with roller actuator (courtesy, Igranic Electric Co., Bedford)

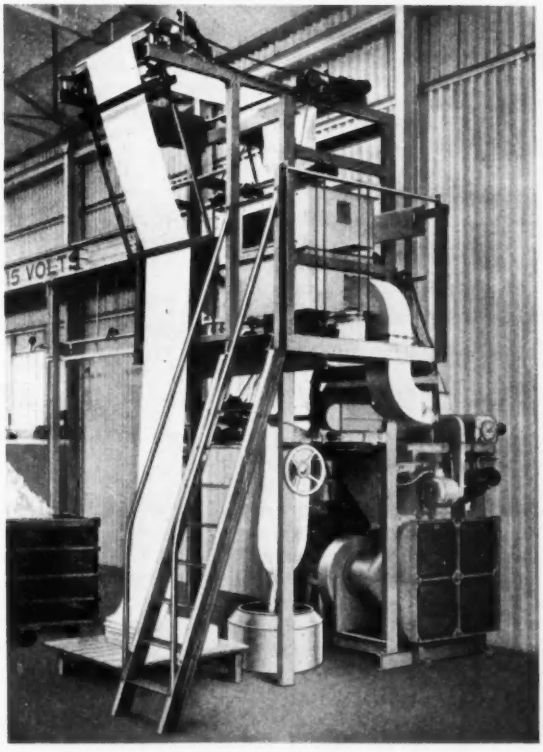


Fig. 5 (right). Pegg-Pasold continuous dyeing machine uses snap-action switch for control of overfeed (courtesy, S. Pegg and Son, Leicester)

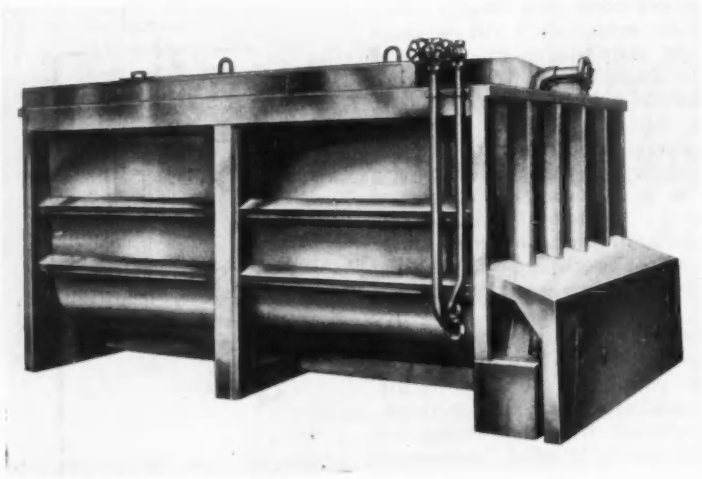


Fig. 6. The Pegg pulsator hank dyeing machine uses several snap-action switches in its automatic control (courtesy, S. Pegg and Son Ltd.)

probably have been avoided by installing a micro switch either for warning an operator, or for cutting out movement of a machine or a machine part in time, or by interlocking (see Fig. 4).

Considerable interest has been shown recently in the use of precision switches for control of machine and process operation in connection with "Automation" or the fully automatic factory. Use of these switches not only accelerates automatic operations, but also produces a high degree of safety. Basically the idea of electric interlocks is simple, such as turning off an electric motor when the switch mechanism starts "feeling" the location of a machine part. Such events set automatically in action co-ordinated movements, supported by "non-forgetting" interlocks. Snap-action switches and mercury switches fill certain needs in interlock circuits.

Typical Applications

In the Pegg-Pasold continuous drying machine for circular knitted fabrics and warp loom fabrics when the selvedges have been sewn together to form a tube, a snap-action switch is incorporated in the design (see Fig. 5). This automatic switch controls the amount of overfeed in the fabric as follows. The dryer consists, briefly of a heater with fan, a stretcher, several rubber disc rollers, a turntable work container, a pair of calender rollers, and a conveyor belt for carrying the fabric. The rubber disc rollers pull the fabric upwards from the turntable work container at the machine base during exposure to the hot air stream. The rubber disc rollers then slightly overfeed to an extent which is controlled by an adjustable Crabtree snap-action switch. A small surplus of fabrics is shaped by the air stream into a "bubble." Then the vibrated and relaxed fabric is carried through the drying chamber. It will be appreciated that the snap-action has an important part to play in preparation of the fabric for a relaxed condition during hot air drying.

Another machine where Crabtree snap-action switches are used is the Pegg Pulsator hank dyeing machine (Fig. 6). Used for dyeing hanks, its automatic controller governs the intermittent circulation of the dye liquor. It starts, stops and re-starts the motor on a pre-determined cycle, and incorporates means for automatic reversal of liquor flow when required.

The control unit contains a twin motor drive and a selector switch. For one-way flow the selector switch is set in the "Auto One Way" position. Similarly a "two way" position may be selected. Start and stop buttons are provided for and a number of Crabtree snap-action switches are employed.

In the Pegg Bromac finishing machine a number of micro-switches are incorporated in the electrical equipment operated by cams. The latter are arranged to produce automatic action at a predetermined cycle. The automatic switches control the opening and closing of the press beds. Exact pressure and time factors can thus be pre-set by means of pressure limit switches and an automatic timer.

Beauty and Quality

Displayed on the facing page are some examples from the latest ranges of the high quality specialities manufactured by Ashton Brothers and Co. Ltd., 29 Portland Street, Manchester 1. Known throughout the world for their cloths, the examples shown are some of the company's range of furnishing and household textiles.

(1) Boxed in a very attractive manner, this "Stronghold" sheet set contains one plain hemmed sheet, one embroidered sheet and two embroidered pillowcases. The sheets are available in three sizes—70, 80 and 90 × 100 ins., and are produced in a variety of embroidered designs.

(2) A distinctive furnishing fabric (Qual. F1849) 48 ins. wide, in black, gold and electric blue, beautifully balanced for the utmost effect.

(3) In black, white and crimson this 48 ins. furnishing (Qual. F1780) employs to the best advantage black and white gimp yarns in a crimson ground.

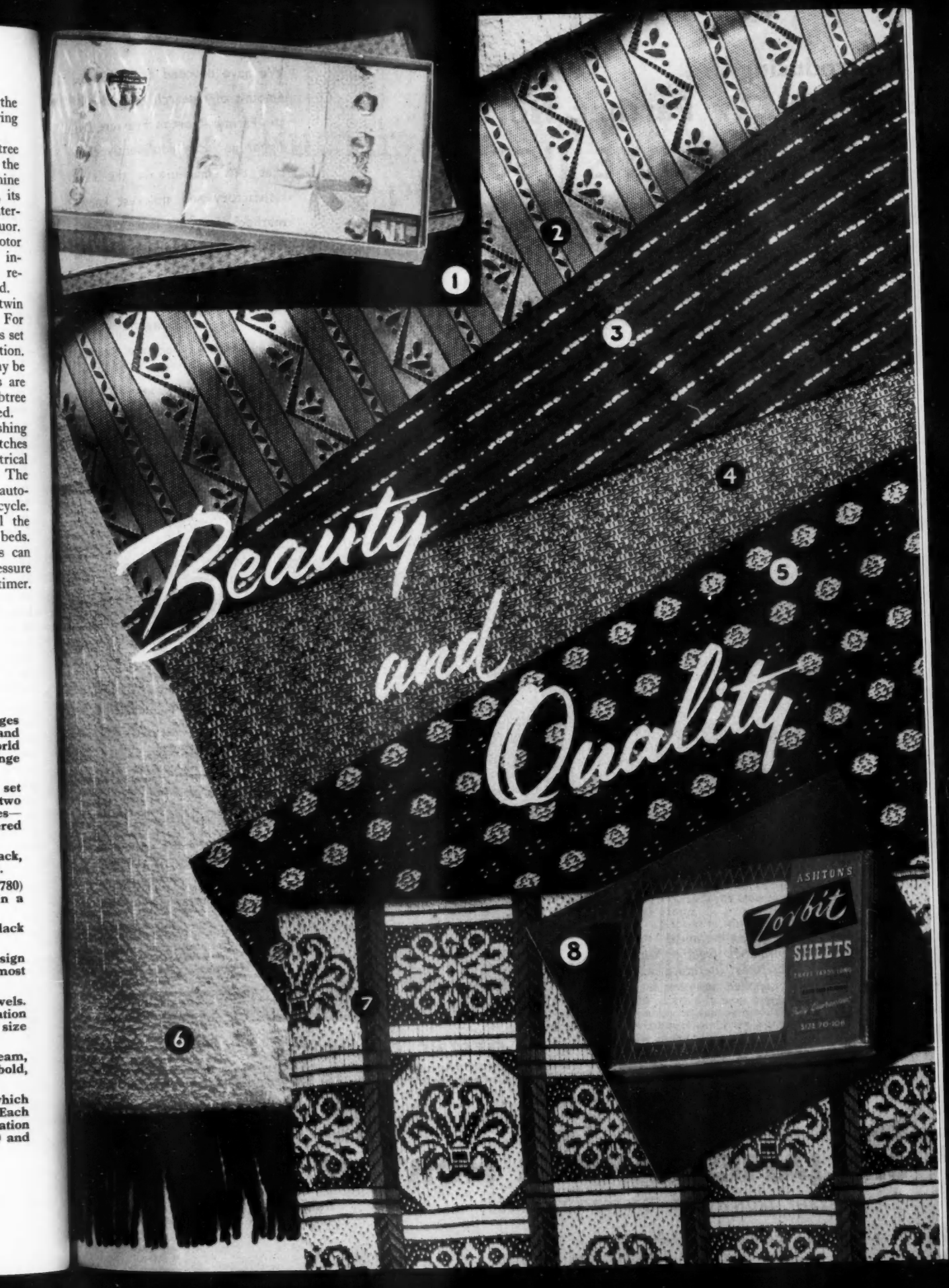
(4) Qual. RD2115. A 54 ins. crease-resist furnishing uses crimson, black to white yarns to achieve this lovely mingled effect.

(5) Qual. F1780. Strong contrast characterises this symmetrical design in a 48 ins. furnishing. A matt black ground imparts the utmost support to the primrose and white figuring.

(6) One example from another of the company's specialities—towels. The one shown is in a shade of peach with silver "Lurex" decoration and black corded fringe. It is produced in five ground colours, size 36 × 60 ins.

(7) "Cresta" (Qual. F1644). This 48 ins. cloth utilises middle green, cream, black, primrose, and two shades of red in the yarns making this bold, embossed jacquard design.

(8) "Zorbit" sheets. Manufactured by a new weaving technique which ensures a specially strong selvedge for longer wearing life. Each sheet is marked with the size on a woven label for easy identification in the linen cupboard. They are made in three widths—70, 80 and 90 ins.—and are 3 yds. in length.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Beauty and Quality
ASHTONS
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SHEETS

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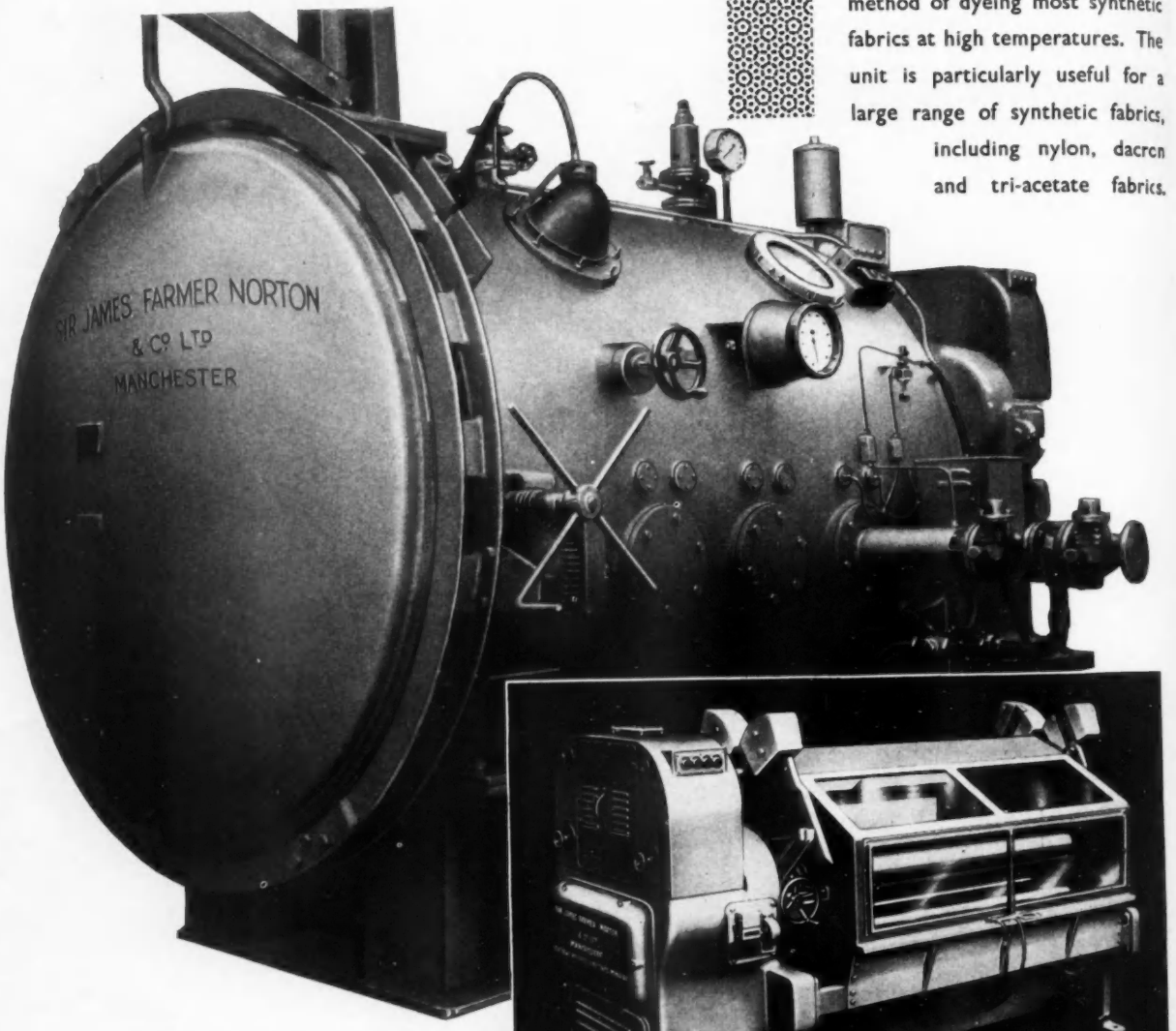

The fullest technical information together with illustrated literature will be supplied on request

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Oil Burners for Mill Boiler Plant—I

Rotary and pressure jet are the two main types of burners. The first converts the oil stream into a cloud of particles and the second does the same but the atomising medium also plays an important part in moulding and stabilising the flame form

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THE increasing use of fuel oil as a source of heat energy in steam raising, water heating and other heat-using plant is due to a number of factors. These in the main, may be cited as being that the elimination of solid fuel reduces space requirements, provides a cleaner boiler plant and makes for easier operation in that the handling of solid fuel and ash is no longer necessary. Furthermore, quick and even heating is accompanied by a longer boiler life, high combustion efficiency and competitive fuel costs; also extreme flexibility, through a heating medium that responds readily to full automatic control. From the foregoing it will be seen that the equipping of a boiler plant, either new installations or by converting from solid fuel firing, offers many desirous commercial advantages, particularly so as technological advances, as the result of intensive theoretical and practical research, has produced automatic oil burners which are reliable under all conditions of operation.

Before considering modern burner design, it is, of course necessary to give some thought to the characteristics of the fuel oil employed which should, if boiler efficiency tests are to be run, include details of gross and net calorific values and also flue gas heat losses. Whilst reference must be made to these, the characteristics to be discussed here are specific gravity, viscosity and flash point. The numerical value of the former is the ratio of a given volume of oil compared to the same volume of water, and specific gravity of the water being unity at 39°F. As oil expands under the influence of heat, thus reducing its specific gravity, the numerical value must be referred back to a standard temperature; custom accepting this as 60°F. throughout the petroleum industry.

This may be explained by considering a fuel oil having a viscosity of 200 secs., Redwood No. 1 at 60°F. and a specific gravity of 0·935. At this standard temperature the weight of the oil, the weight of water being 62·43 lbs./cu. ft. would be $0{\cdot}935 \times 62{\cdot}43 = 58{\cdot}37$ lbs./cu. ft., whilst at 100°F. the specific gravity of the oil would have decreased to 0·92 and its weight to $0{\cdot}92 \times 62{\cdot}43 = 57{\cdot}43$ lbs./cu. ft. Oil having a viscosity of 200 secs. Redwood No. 1 is classified as a heavy oil, and the term viscosity indicates that property which opposes the relative motion of the parts of the oil, or is a measure of the fluidity of the oil, which not only effects its free flowing through pipe lines, but is also an important factor in determining its atomising condition. In order to obviate the high oil pressure necessary to overcome pipe friction when employing heavy oil and to ensure efficient atomisation, the oil is pre-heated to reduce its viscosity.

Viscosities are measured in America by means of the Saybolt viscometer, in Europe by the Engler instrument and in Britain by the Redwood; in which, using rape oil as the basis of comparison, the viscosity is measured by the number of seconds which 50 c.c. of oil takes to reach a predetermined mark at any desired temperature. The last-named characteristic, or flash point, is of great importance, as this indicates the temperature at which inflammable vapours begin to pass off from the oil and is a measure of its safety in handling, also the point at which the vapours given off form an inflammable mixture in a combustion space when correctly combined with air.

Efficient combustion is dependent upon good atomisation and vigorous mixing of fuel and air. Too rich a mixture, or a mixture in which there is an air deficiency, results in incomplete combustion, whilst an excess of air above that required for complete and efficient combustion absorbs heat from the products of combustion and thus reduces efficiency. Theoretically 179·94 cu. ft. of air or 13·75 lbs. of air at 60°F. are consumed per pound of fuel oil containing 83·5% carbon, 11·68% hydrogen and 3·27% sulphur and the maximum CO_2 content of the flue gases would be about 16%. However, it is stated that this high CO_2 percentage is not attainable nor yet desirable in practice and a CO^2 percentage of 14 should be looked upon as the maximum, as, if carried beyond this figure, there is danger of CO appearing, 1% of which would increase the fuel consumption by approximately 6%.

With the carbon constituent of an average fuel oil, a maximum CO_2 percentage would demand 28% excess air required over that theoretically necessary, so that if 13·75 lbs. of air per pound of oil are theoretically required, the actual amount would be $13{\cdot}75 \times 1{\cdot}28 = 17{\cdot}6$ lbs., which at 60°F. would be $13{\cdot}09 \times 17{\cdot}6 = 230$ cu. ft. per pound of fuel. Once the excess air has been adjusted, the oil and air supply rate should remain constant, which means that air leakage through boiler settings, etc., should be reduced to the barest minimum, so that the only source of air is that supplied by the burner, except in those cases where the particular burner used calls for a secondary supply of air for combustion.

Oil Burner Types

The function of an oil burner is to deliver the fuel oil into the combustion chamber in a finely divided state, the process, as stated, being commonly known as atomisation. In order to obtain good combustion conditions, the spray should be split up into particles of varying size of between about 30 and 150 microns (1 micron = 0·001 m.m.). Not all the droplets given by an oil spray are of the same size; the average size and the spread between the smallest and the largest depend upon the type of burner and whether the burner is a good example of that type.

Combustion in boilers usually takes place at atmospheric pressure, and it is more usual to arrange for the oil to be moving comparatively slowly and to be struck by a fast-moving blast of air or steam. Burners designed to so operate are usually known as blast burners. They may be divided into three main types, according to the pressure of the atomising medium employed, i.e. low-pressure burners operate at from 6 ins. to 30 ins. w.g., medium-pressure at 3 to 15 lbs. p.s.i. and high-pressure from 15 lbs. p.s.i. upwards.

For low-pressure and medium-pressure blast atomisers, air is usually employed as the atomising medium. For the low-pressure air burner, the air is supplied by a centrifugal atomising fan, while for the medium-pressure air burner for installations where there is no compressed air available from the common type of compressor, a small-bladed rotary blower is frequently used. In the case of high-pressure burners the atomising medium is usually steam.

In addition to dividing burners into low-pressure, medium-pressure and high-pressure, all three types can be sub-divided into those in which the atomising medium meets the fuel at the exit from the burner, and the alternative method, usually known as the internal mixing type, in which the oil and the atomising medium are brought into contact within the burner and atomisation may be effected in one, two or even three stages.

There are two other main types of burner; the rotary and the pressure-jet. The former is a development of the low-pressure air burner. The oil is distributed over the air blast from the lips of a rapidly rotating cup, which serves the dual purpose of ensuring an even distribution of

oil and initiating atomisation. Two main designs are usually encountered, i.e. those in which the cup is rotated by means of a small air turbine, and those in which the cup is rigidly mounted on a shaft which can be either coupled directly to an electric motor, or belt driven by an electric motor. A variant of the latter is where the cup is driven by a small steam turbine.

There exists a fundamental difference between the pressure-jet and blast type of burner. The former only converts the oil stream into a cloud of particles, whilst the latter not only does this, but the atomising medium also plays an important part on moulding and stabilising the flame form. Thus, the fundamental requirement[1] of a pressure jet burner are a pump to raise the pressure of the oil to between 50 and 200 lbs. p.s.i., a heater to reduce the viscosity to 50 or 200 secs. Redwood No. 1, and a nozzle to convert the pressure energy of the oil to kinetic or velocity; to eject the oil from the nozzle in a cloud of small particles.

The main feature of all burners of this type is a swirl chamber, usually conical in form. At the apex of the cone is a final orifice through which the nozzle sprays. Oil is introduced tangentially into the base of the conical chamber through two or more channels, from which it emerges at a moderate velocity; around 30 ft./sec. Provided that the oil is sufficiently fluid and that the internal friction of the swirl chamber is low, the angular velocity of the oil is increased as it approaches the final orifice due to the conservation of angular momentum, and the oil in the final orifice will have a high translational and rotational velocity so that its energy of motion represents the greater part of the original pressure energy.

The oil in the swirling chamber rotates about an air core. At the surface where the oil and air meet, the kinetic energy of the oil is equal to the original pressure energy if friction is neglected. Thus, if the oil entered the nozzle at a pressure of 100 lbs. p.s.i. at the air core, neglecting velocity towards the outlet, it will rotate at a velocity of 120 ft./sec.

The oil leaves the final orifice in the form of a thin rapidly rotating column. This immediately spreads out into a bubble shape which within an inch, due to the rotation and the action of the ambient air, changes to a net-like form and this breaks up into a cloud of small droplets. The size of these droplets is far from uniform, and the normal type of pressure jet will turn an ounce of oil into millions of drops varying in size from about 20 or 30 microns to 200 microns.

Pressure-Jet Burners

A number of advantages can be claimed for these, the most outstanding of which are (*a*) their simplicity, and (*b*) the wide operating range covered; nozzles can be made in sizes ranging from the smallest to the largest throughout. They also possess quite a few inherent disadvantages. One of these is that as the output varies approximately as the square root of the pressure of the oil at the nozzle, and as the oil pressure can usually be varied between 50 and 200 lbs. p.s.i. (a pressure range of 4 : 1), the oil output range is usually limited to about 2 : 1. This compares somewhat unfavourably with a blast atomiser where ranges of 5 : 1, or even more, are quite common. To overcome the apparent deficiency, developments have led to many types of pressure jet burners modified in such a way as to give considerably greater latitude of oil consumption.

Fig. 1 illustrates one of the range of fully automatic pressure jet burners produced by Prior Stokers Ltd. It is the Model S.H.E. which, with a capacity of 2,500,000/4,000,000 B.T.U.s/hr. operates on residual oils with a viscosity of 200 or 950 secs. Redwood No. 1 at 100°F. The machine has a special design combustion head incorporating adjustment for primary air and flame stabilisation. Also a device for providing delayed action cut-in and instantaneous cut-off of oil supply to the nozzle; together with a two-stage starting arrangement.

Efficient combustion results from the proper mixing of the fuel oil and the air. The air stream divides at the rear of the primary air tube with the major portion proceeding along the outside and a relatively small amount passing through the openings at the back of the air tube. Whilst the principal purpose of the primary air is to prevent the formation of too low a pressure area in the vicinity of the oil nozzle, it does, in addition extend the ignition arc into the oil spray when the burner is started.

The secondary air, which constitutes the main air supply, passes between the burner blast tube and the primary air tube, through a finned collar, which imparts to it a rotary motion, and hence out of the burner into the combustion space. The air, leaving the end cone, has a radial as well as axial motion, but no longer rotates and consequently, is in the form of a conical sheet. Into this cone of air the spray of oil is injected, resulting in an intimate mixture of oil and air, capable of sustaining an intense flame. The ordered turbulence created by the air stream sucks any stray fuel into the flame and ensures the completion of the combustion process.

The oil is pumped into an electric immersion heater where its temperature is raised and maintained at 170°F. to 190°F. When the burner is started, a device situated to the rear of the combustion head, withdraws any cold oil in the pipe lines between the heater and the burner nozzle, replacing it by hot oil. Only when this has taken place and the hot oil has reached a pressure at which atomisation will occur, a valve situated immediately behind the nozzle is opened and the burner lights up at low pressure approximately 120 lbs. p.s.i. After a short delay it automatically steps up to final pressure which is set to suit the required output. When the burner cuts out, the operation of this device is reversed and the in-

Fig. 2 (right). Two "Electromatic" Model T.M.D. burners, operating 0-200 sec. fuel oil, firing a twin-flue horizontal hot water boiler

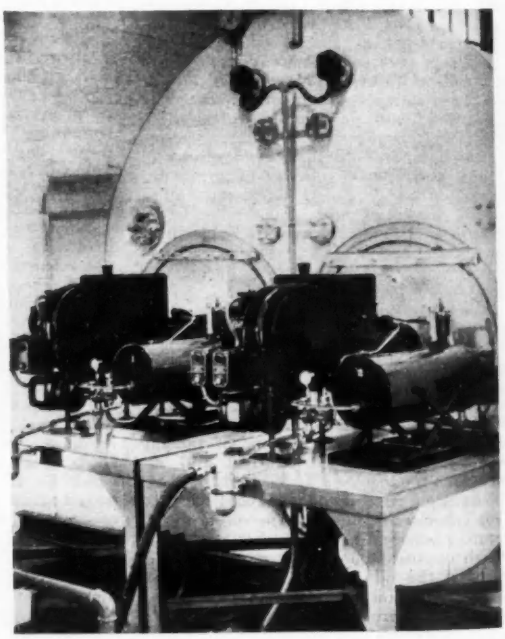


Fig. 1 (below). The "Prior" pressure jet fully automatic burner is fitted with a special flame stabilization device. This ensures thorough mixing of fuel, oil and air

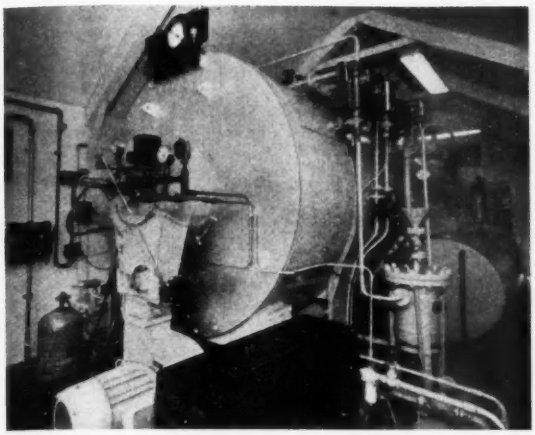


Fig. 3 (right). A "Steambloc" packaged boiler, Unit No. 400, with a capacity of 10,000 lbs. steam per hr. The oil burner fitted is of the fully modulating pressure-jet type

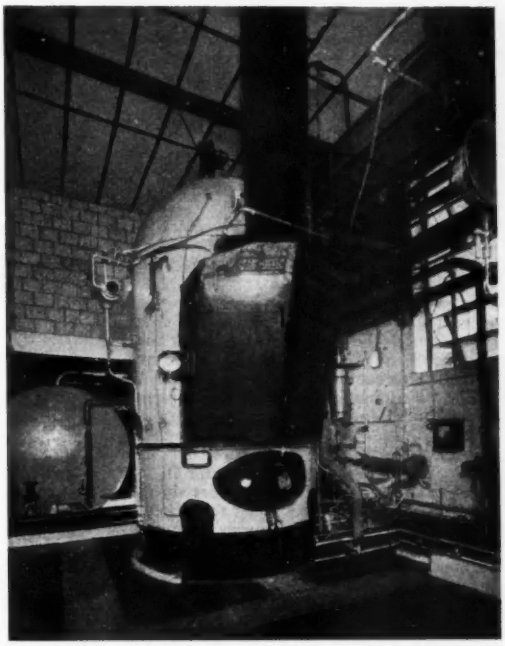


Fig. 5 (above). Other features inherent in the "Urquhart" burner, shown fitted to a Cochran boiler, are that (1) when the plant stops, oil is withdrawn from the atomiser automatically and (2) a metering oil pump provides a constant flow of oil entirely independent of temperature change in the oil

stantaneous closing of this valve shuts off the supply of oil to the nozzle while still at atomising pressure.

The twin-flue horizontal hot water boiler shown in Fig. 2 is equipped with two "Electromatic" Model T.M.D. burners operating on 200 secs. fuel oil; one to each flue. The manufacturers are G. C. Pillinger and Co. Ltd., a concern producing fully automatic pressure jet burners having a range of from 60,000 to 4,500,000 B.T.U.s/hr. This equipment is suitable for the conversion of both hot water boilers and steam raising plant to oil firing, and can be supplied for operation on diesel oil, 200 secs. fuel oil, and in certain cases, 950 secs. oil.

On the "Electromatic" a purposely designed combustion head enables hot oil to be fed for a period of 30 secs. to a point just behind the nozzle, which gives conditions for a smooth and instantaneous start. After this circulating period a magnetic valve, operated by a time-delay relay on the control panel is closed, and a build-up to operating pressure is effected immediately. Incorporated in this head is a cut-off valve, which shuts immediately pressure drops below 50 lbs. p.s.i., giving instantaneous shut off, thus preventing any after-burning and consequently carbon sing of jets and electrodes. All models are fitted with makers own patent "Lumastat" photo electric cell flame failure control which forms an integral part of the burner.

A fully-modulating pressure-jet type burner, with gas-electric ignition and photo-electric cell for flame failure control, fires, the "Steambloc" fully automatic package boiler illustrated in Fig. 3. This unit, made by Spencer-Bonecourt-Clarkson Ltd., is available as either a steam or hot water boiler, in evaporative capacities ranging from 1,500 to 1,800 lbs./hr. (from and at 212°F.), or equivalent heating output in B.T.U.s. It is completely self-contained, incorporating its feed pump and feed water tank, oil pump, oil heater, fan and control equipment; requires little more than half the space needed for conventional boiler plant; and has an efficiency well over 80% under normal commercial operating conditions.

Heavy grades of fuel oil up to Bunker "C" are employed; both steam and electric heating equipment being provided. Under the direction of the automatic control gear, the burner equipment is arranged to give modulated flame control for loads down to one-third of normal rating. Below this load, the regulation is by "on-off" control. This not only ensures a high 24-hour efficiency, but also guards against any possibility of flame instability at light loads.

The boiler itself is of the three-pass super-economic type. A feature is the use of a flue that is partly corrugated and partly plain. The use of a corrugated section increases flexibility and minimises stresses due to expansion and contraction, whilst a plain cylindrical portion at the burner end ensures correct flame development. The return tubes are of comparatively small diameter, the advantages of this being two-fold. Firstly, the high velocity of the gases in a small-diameter tube gives the turbulence that is essential for maximum heat transfer. Secondly, the mechanical properties of the boiler are improved, since the

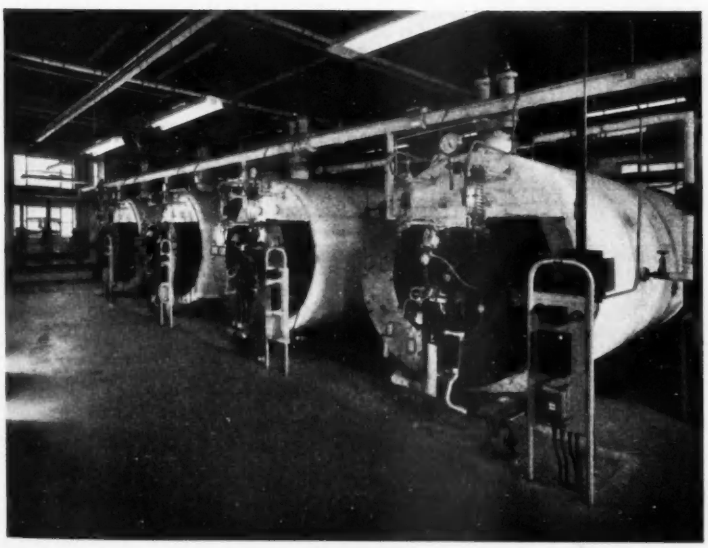


Fig. 4. Range of four Economic boilers fired by "Urquhart" automatic fuel oil burning equipment. An important design feature is a device by which the oil is pre-heated by radiant heat received from the oil flame itself

small-diameter tubes not only allow wide and stronger ligaments in the tube plate, but are themselves more flexible and able to take up any unequal expansion due to the temperature difference between the second and third passes; without the tendency to distortion of the tube plate and consequent leakage, which might occur with stiffer tubes.

The boiler shell is covered with lagging and steel cleading to reduce heat losses to a minimum, but full access for tube cleaning and inspection is provided by a quick-release door at the back end of the boiler, this door also carrying part of the combustion chamber refractory lining. It is seldom necessary to remove the front end-plate of the boiler since a small soot door is provided in the front smoke chamber for removal of dust and deposits.

The automatic control equipment, located in a control cabinet forming a part of the unit, has been thoroughly proved in service. The starting sequence, for example, is such that upon switching on, or the operation of the steam pressure device (which is the master control for the system) the unit starts up the oil pump, energises the oil heater and establishes correct oil temperature and water-level. It then starts the forced-draught fan and opens the damper to give a purging period, air being blown through the gas passes to make sure that there is no oil vapour or gas present which could cause a puff. Next, the h.v. spark is switched on and proved; i.e. the equipment makes certain that a spark is actually present and that the transformer is not merely energised. It next turns on the gas supply and proves electronically that the gas pilot is ignited, before oil is admitted to the burner.

When stable operation of the main burner has been proved, photo-electrically, the gas pilot and electric ignition are turned off and the burner operates at minimum firing rate, continuing at this low rating until the boiler comes up to pressure. As previously mentioned, the burner is subject to "on-off" control up to approximately one-third load, and by modulation of the flame from one-third load to full load, oil and air supplies being automatically adjusted for efficient combustion at all loads.

Full protection is provided against low water-level, high steam-pressure and flame failure; the flame being under constant observation by the photo-conductive cell. Should any of these faults occur, the control equipment takes the necessary steps to restore normal conditions. If, for any reason, it is not able to restore normal conditions, the equipment will shut down the boiler. Any failure is always to safety.

Boiler Front Units

Figs. 4 and 5 illustrate applications of oil burning equipment manufactured by Urquhart's (1926) Limited. An important design feature of these equipments is a device by which the oil is pre-heated by radiant heat received from the oil flame itself, and another feature is that when the plant stops, oil is withdrawn from the atomiser automatically. The equipment also incorporates a metering oil pump which provides a constant flow of oil entirely independent of temperature change in the oil. Furthermore, the complete boiler front assembly of atomiser, pre-heater and pull back device forms a compact unit projecting only a few inches from the boiler front plate. It can therefore be installed where the situation of the boiler will not permit a unit type burner to be installed; the control system and motor-driven compressor-pump unit can be placed in the most convenient position.

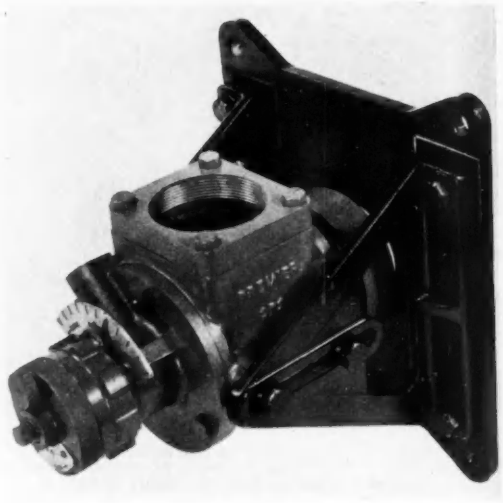


Fig. 6. The burner illustrated —recently introduced by Premier Oil Burners—incorporates means whereby the need to operate with separate air and oil controls is eliminated

The atomiser together with the oil pre-heating unit is mounted in such a manner on the boiler front that it can be easily and quickly withdrawn for cleaning without disconnecting any pipes. The pre-heating unit, whereby, as already stated, the pre-heating of the oil is accomplished by radiant heat from the flame itself and not by a separate electric pre-heater, comprises a metallic conductor of high conductivity metal projecting through the furnace front below the atomiser. This metallic "toe" conducts heat to the pre-heating head, in which are arranged a number of passages through which the oil travels. In order to ensure a supply of warm oil for starting purposes, a very small electric immersion heater is inserted in the pre-heater head. This immersion heater, for the greater part of its length, is inserted in metal and not oil, thereby preventing carbonisation of the oil on the heater surface, a common trouble with electric heaters immersed in oil.

The use of the heavier oil presents a difficulty with any type of oil burner, in that if it is allowed to run over the face of the atomiser when the plant stops, the radiant heat from the combustion chamber causes the oil to carbonise on the atomiser. This fouling of the atomiser accumulates and becomes worse every time the plant stops. To overcome this, a simple glandless pump is incorporated in the boiler front assembly. When the plant stops, oil is immediately withdrawn, both from the atomiser and from the pre-heating chamber. The pump consists of a diaphragm subjected to air pressure on one side and spring pressure on the other. While the plant is firing, air pressure from the blower holds the diaphragm forward against the spring; as soon as the plant stops, the spring presses back the diaphragm and the oil is instantly withdrawn from the atomiser.

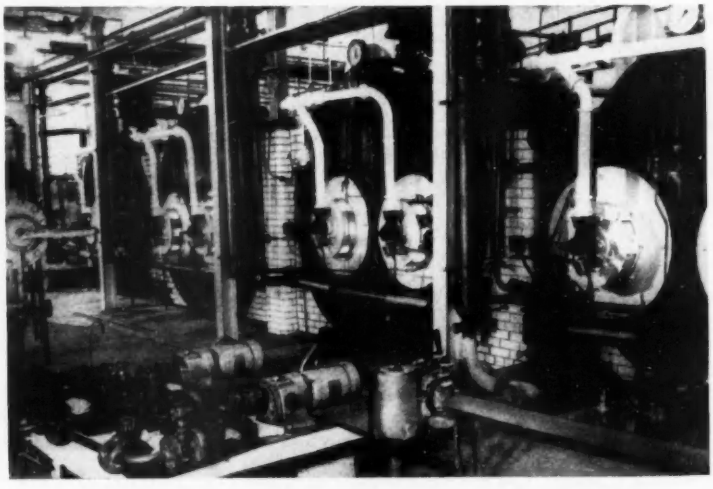


Fig. 7. These four Lancashire boilers are each fired with two "Rotavac" No. W.S.F.4 burners on air directors with semi-automatic control

The blowing unit is electrically driven and is of the positive rotary blade type, thus eliminating the use of valves and ensuring quietness of operation. Air is delivered at a pressure of about 5 lbs. p.s.i., and the relief valve is set to suit the requirements of the installation. Oil is delivered by a metering type pump which gives the exact quantity of oil independent of any change of viscosity, or pressure in the oil supply.

Self-Proportioning Burner

Premier oil burners have recently introduced a self-proportioning low-pressure type equipment which provides a constant air/oil ratio. The air and oil valves can be independently operated for initial setting, but are automatically locked together after flame adjustment, to give self-proportioning to a five to one range. It is claimed to supersede the conventional design of low-pressure air burners with which it is necessary for the operator to work the burner with separate air and oil controls.

The Premier burner, shown in Fig. 6, consists of a cylindrical flange casing in which rotates a single-ported air valve, mounted and rigidly fixed to an oil tube which passes through the end covers. Air control is affected by a handwheel located at the rear end of the burner. A "Vee" slot plug type oil valve is mounted in the rear end cover and held in position by a strong spring located with a screwed cap. This is controlled by a handwheel rigidly fixed to the body of the valve. Both the handwheels of the air and oil valves are so arranged that they can be automatically locked together by means of a spring-loaded plunger. The oil nozzle, which is detachable, is screwed into the front portion of the oil tube, whilst the front cover of the burner is fitted with an adjustable nose cap. The burner is itself attached to the quarl plate by means of two support brackets which have elongated holes to facilitate adjustment of burner to quarl clearance.

In operation, all air for combustion and atomisation enters the main air inlet. A small proportion of the air for atomising purposes, is allowed to pass through a separate chamber of the air valve to emerge at high velocity around the orifice of the oil nozzle. This atomising air is uncontrolled and remains at constant pressure irrespective of any position of the air valve.

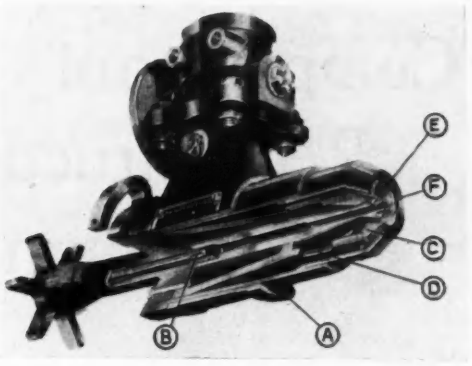


Fig. 9. Cut-away view of Type W.S.F. burner. (A) Oil inlet port. (B) Vee-slot metering valve. (C) Inner air nozzle. (D) Tangential air inlet openings. (E) Oil outlet orifices. (F) Secondary atomising air outlet

The main air stream required for combustion, passes through a peripheral port in the air valve and is controlled between maximum and minimum throughput by a rotational movement of the valve. The air port is so arranged that a high swirling motion is imparted to the incoming air. This highly rotating air mixes with the atomised oil at the burner orifice, to give perfect conditions for combustion.

The oil, which is controlled by a precision machined "vee" slot cut on the periphery of the plug valve, passes through the centre of the valve and along the oil tube, where it is first broken up by air passing across the outer edge of the small vortex cup. The atomising air emerging from the centre chamber of the air valve picks up the oil from the small vortex and the resultant air/oil mixture is finally atomised in the larger vortex cup. This atomised mixture is then directed by the secondary air through the nozzle into the burner quarl.

High Velocity Atomisation

It is claimed that high velocity atomisation resulting in high efficiency is obtained by the use of the "Rotavac" W.S.F. oil burners, shown fitted to the range of Lancashire boilers illustrated in Fig. 7. These, as will be seen from Fig. 8, result in high combustion. The equipment can burn any liquid fuel including the heaviest, cheapest grades of residual oils and coal tar fuels, and is fitted with a removable inner assembly simplifying maintenance and protecting the nozzle from radiant heat damage. A flame shape regulator permits adjustment of the flame to the shape required while the burner is in operation.

It is a low-pressure unit, providing, in effect, atomisation in two stages. From the cut-away view shown in Fig. 9 it will be seen that all atomised air enters the burner at a single inlet connection. The oil enters through the inlet port (A) and passes to the nozzle via a vee-slot metering valve (B). Primary atomising air enters the inner air nozzle (C) through tangential inlet openings (D) which gives the air a whirling rotary motion. As it approaches the space round the oil nozzle with a maximum velocity it strikes and atomises the oil coming from the orifices (E).

As the resulting air/oil mixture leaves the inner air nozzle it is hit by the secondary atomising air coming from the outer air nozzle opening (F) in a converging cone, this in fact further atomises the oil producing a burnable mixture of air and oil. The regulating sleeve allows the flame length to be adjusted while the burner is in operation. This is accomplished by applying a varying degree of swirl to the air entering the burner. The flame shape can thus be changed at will.

(*To be continued*)

Reference

Gollin, G. J., Fuel Oil and Oil Firing; reprint of paper published in the Heating and Ventilating Engineer, 1955.

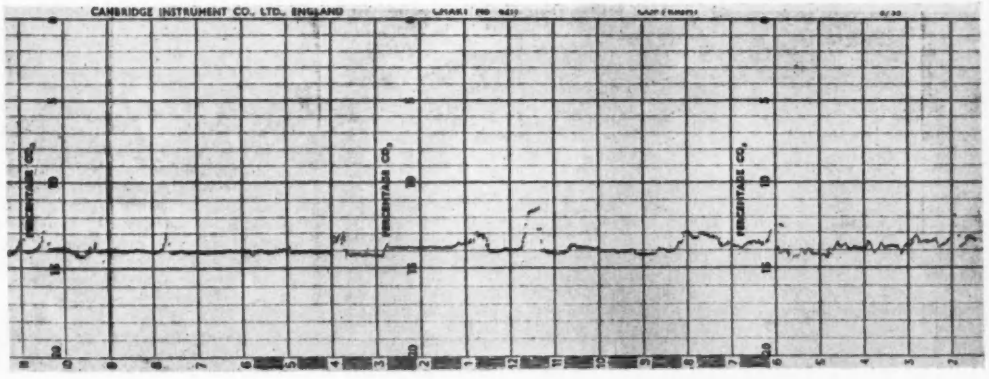


Fig. 8. The high combustion efficiency obtained by the use of the oil burning installation shown in Fig. 6 is amply illustrated by this CO_2 recorder chart. The installation shows an average of 81%

Completion of 5-Year Reconstruction Programme

A close-up of one of the many cast-iron supports in the old shed, with a "cap," spinning frame built round it

A £1,000,000 scheme of modernisation and reconstruction—the largest ever undertaken within the Scottish wool industry—reached its final stage recently when the first group of machines in the new spinning shed at the Kilncraigs Mill of Patons and Baldwins Ltd., Alloa, commenced production. It is the culmination of a five-year plan by the firm to make its Scottish mills—the others are a worsted plant at Bo'ness (West Lothian) and a woollen plant at Clackmannan—among the most efficient in the world. Mr. J. S. Bullimore (chairman, Patons and Baldwins) said the object of the reconstruction was to enable the 1,500 employees at Kilncraigs Mill to produce the highest quality yarn at the lowest possible price. "That means modern machinery and methods which can only be operated to best advantage in modern buildings planned for the purpose," he said.

A feature of the reorganisation and rebuilding programme is that it has been carried out with virtually no interference to current production. The Alloa mill is on the original site where John Paton erected his first spinning mill in 1814 and the periodic extensions carried out over the years had resulted in a conglomeration of buildings which in their location, construction and layout were not conducive to the standard of efficiency now required. Having dealt with a similar problem in England by the construction of an entirely new factory at Darlington, Patons and Baldwins decided that the best way in which to bring their major Scottish unit into line was by a sustained programme of modernisation and reconstruction.

The programme has been carried out in three main phases: the centralisation of all engineering and maintenance services, including new offices for the technical staff; the construction of an entirely new building, covering 56,000 sq. ft. and including a new dyehouse, to house all "wet" processes; and the demolition of a section of the oldest spinning shed property and the erection of a new 48,000 sq. ft. shed in which production began recently.

Possibly the greatest transformation of the whole programme was achieved in the new dyehouse. Previously the various processes had been located in three different parts of the mill. By very careful planning, it was possible to transfer these to temporary locations while the old buildings were demolished and the single new structure erected, with the very minimum of interruption to current production. The whole operation was completed by September last year, and all wet processing—wool scour, wool dye, yarn scour, yarn dye, bleaching, and stoving—was in full production in the new building.

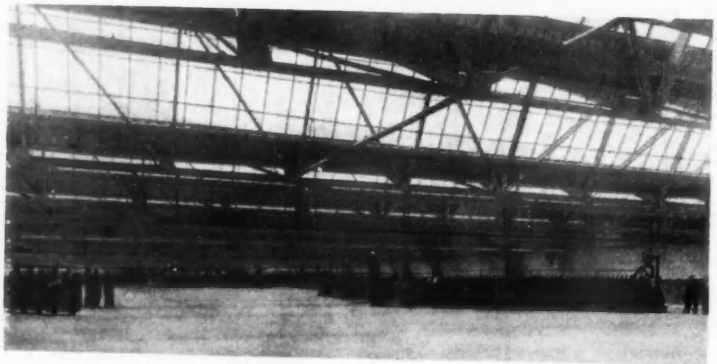
The building is sited to permit a straight flow of yarn from the oily yarn store direct to the wet processes and from there to the adjacent warehouse for final examination and making up according to customers' requirements.

The opportunity was taken to install the latest machinery and to use new methods which Patons and Baldwins research teams had shown could not only result in dyes of exceptional fastness to light and washing, but could reduce to a minimum the damage which can be done to natural fibres by harsh or inefficient treatment in wet finishing.

Various factors influenced the planning of the new dyehouse. The two main ones were the increasing public demand for dyed shades of higher fastness than had been previously regarded as necessary; and the growing tendency among manufacturers to leave the dyeing of wool to the last possible stage. In the case of spinners, this meant spun yarn, and in the case of knitwear, the knitted garments, either completed or uncompleted.

Since 1952, Patons and Baldwins have made progressive advances in the technique of applying to yarn almost all shades with a high degree of levelness but without any loss in the stringent standards of fastness. Until the new dyehouse came into operation, these requirements could only be obtained by dyeing at earlier stages of manufacture. Not only have these advances achieved substantial economies, particularly in the holding of stocks, but customers' orders for new fast shades in stock lines can now be executed in about one-quarter of the time required formerly.

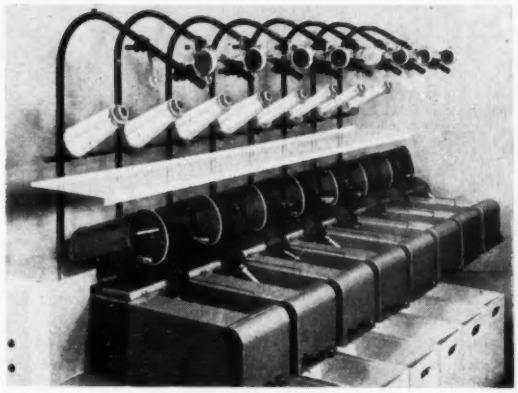
The reconstruction as a whole has led, without extra spinning capacity or increased floor space, to greater efficiency, improved utilisation of the mill area, a speedier production flow, and improved supervision. Together with other advances such as air-conditioning and the most modern methods of lighting, these have in turn promoted higher productivity.



The vast new spinning shed at the Kilncraigs Mill, Alloa, showing, on the right, three cap spinning frames already in production

Muschamp/Kidde Double Disc Yarn Tension Compensator

Three models of the compensator are available with control springs designed for the following output tensions: (a) 0 - 60 grammes, (b) 10 - 140 and (c) 100 - 300 grammes



Muschamp Model SS100 high speed pirn winder equipped with the double disc compensators, set at 15 grammes tension, winding 100 den. filament rayon yarn at 5,200 r.p.m.

FOLLOWING a recent agreement with Kidde Textile Machinery Corporation, U.S.A., Muschamp Textile Machinery Ltd., Keb Lane, Bardsley, Oldham, are now manufacturing under licence the Kidde double disc yarn tension compensator. The compensator can be supplied from Oldham with obvious advantages in service and availability to the British and European textile industries. It can be used on any machine or process where the yarn is required to be delivered at a constant average tension: different models are available which, between them give a wide range of processing tensions.

On pirn winding machines, the double-disc compensator allows yarn to be wound at a steady tension which is maintained irrespective of changes in external conditions such as humidity, yarn speed or ballooning at the supply package. The use of a compensator when pirning flat crepe or bulked filament yarns is almost essential and it will also produce, it is stated, appreciable improvements in quality with all fine yarns such as combed Egyptian cotton and similar qualities.

The compensator consists of two pairs of tensioning discs compounded with a sensitive control arm which varies the pressure exerted by the disc on the yarn. The yarn is led between the tensioning discs in a straight path before passing through a self-threading guide on the control arm and then, through an angle of 90°, to the winding head.

The force on the control arm, which is balanced against the yarn tension, is supplied by a berilium-copper coil spring of low stiffness. A very small change in yarn tension is sufficient to move the arm, thus opening or closing the gap between each pair of discs by mechanical linkage. The length of the control arm has been carefully selected to provide sufficient sensitivity without introducing undesirable inertia effects. The arm is made of light but strong aluminium alloy and is attached to a nylon block which actuates the pins controlling the disc pressure. A special silicone damping agent is applied to the central pivot which, together with the felt mounting of the discs, absorb high-frequency vibrations.

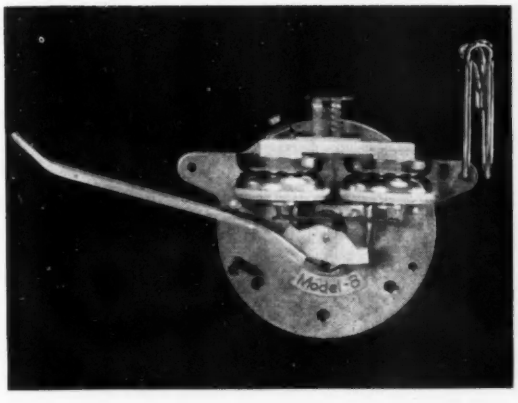
The double-disc compensator can cope with all yarn speed variations and with plucking on the supply package up to about half the output tension. When a pluck occurs, the tension surge detected by the control arm opens the disc out of phase. This means that there is a brief time lag between the opening of the pairs of discs and the possibility of over-compensation is prevented.

Three models of the compensator are available with control springs designed for the following ranges of output tensions: Model 1, 0 - 60 grammes; model 2, 10 - 140 grammes; model 3, 100 - 300 grammes. Within these ranges the desired output tension is obtained by turning the calibrated dial. The same setting on each compensator produces the same yarn tension on each spindle, irrespective of package variations, a particularly valuable feature for uniform production in large installations. This reliability is due to the precision construction of the unit.

Telex Service to Australia

A telex service between the U.K. and Australia opened on October 27. It is available on weekdays only between 2 a.m. and 10 p.m. The charge for calls of up to 3 mins. is £3, and each additional minute or part of a minute costs £1. This new service has been introduced by the British Post Office and the Overseas Telecommunication Commission of Australia to meet a demand from telex subscribers in both countries. It will greatly facilitate business working by making possible exchange of messages with the speed of the telephone.

Front view of the double disc compensator. The desired output tension is obtained by turning the calibrated dial to the required position



Rear view of compensator showing the double discs, the control arm and nylon block, and yarn guides

Delustring Acetate Fibre, Yarns and Fabrics

ALTHOUGH large amounts of acetate yarn are manufactured directly by adding titanium dioxide to the spinning solution quite a considerable amount of delustring is carried out by finishers of acetate fibre materials since it is often more convenient and satisfactory to leave the delustring to this late stage of processing. It is well known that the simplest method of delustring during finishing is to boil the acetate fibre goods in an ordinary soap liquor and the delustring effect is greater and more rapidly obtained as the temperature is brought nearer to 100°C. and as the goods are maintained free from tension. It is surprising how less effective a hot soap liquor may be as its temperature is reduced below 100°C. by say only 5° and actually delustring can be largely prevented by applying sufficient tension to the goods.

This method of delustring has been in use for at least thirty years and gives excellent results but from time to time various alternatives to soap have been taken into use with the idea of improving the treatment. Phenol has been largely employed as an addition to the soap but many other substances including pine oil, methylcyclohexanol, terpineol, and even naphthalene have been suggested and used but not always so favourably from the viewpoint of added cost.

Most of these alternatives to soap are organic in nature and have a fibre-swelling action, so that it can be easily understood that if the boiling is prolonged and a full matt effect is desired there is risk of lowering the strength of the acetate fibres. The delustring effect obtained appears to follow a slight disruption of the fibre surface so that this irregularly reflects incident light. The recent discovery[1] that hydrogen peroxide can assist the delustring of acetate materials is thus quite novel and this is more especially the case since other comparable oxidants such as hypochlorite and sodium percarbonate have been found ineffective.

A new method for delustring acetate fibre goods such as yarns and fabrics is now available. It consists of heating these in a soap liquor to which has been added per litre at least the equivalent of 0·75 c.c. of a hydrogen peroxide solution of 130 volume strength. Thus a full matt appearance can be obtained by heating at 97° to 100°C. acetone-soluble acetate fibre goods for about 1½ hours in a liquor prepared by adding 1 c.c. per litre of the concentrated hydrogen peroxide solution to a 0·5% soap solution. It is found that if the hydrogen peroxide is omitted in this treatment the goods will be only partially delustred. Fortunately this use of hydrogen peroxide does not impart unwanted colour to the acetate fibres nor unduly lower their strength—the treatment simultaneously bleaches the fibres.

The pH of the delustring liquor influences the degree and rate of delustring; the most favourable pH is 9·0 to 9·5 and the delustring is not so good as the pH is reduced to 7·0 although this pH is permissible while a higher pH than 9·5 hinders delustring. The presence of size in the textile material can hinder delustring but the conditions of processing can be adjusted so that both de-sizing and delustring can be simultaneously effected satisfactorily. If the acetate goods are sufficiently pure not to make the delustring liquor too highly loaded with impurities this liquor can be used as a standing bath it then being merely necessary to replenish the hydrogen peroxide used up. Surface active agents other than soap can be used in preparing the delustring bath and they include lauryl sulphate, palmityl, stearyl, and eleyl sulphates; detergents of the alkylarylsulphonate type; and mixed sulphates of the fatty acids which can be prepared from coconut oils, but in general they are all inferior to soap.

The following is a typical process for de-sizing and delustring a satin fabric consisting entirely of acetone-soluble acetate yarns and which has been found to be only partially delustred by a straight treatment for 1½ hours in a 0·5% soap liquor at 99°C. Firstly the fabric is de-sized by treatment for ½ hour at 85°C. in a ½% solution of soap. It is then loosely immersed (preferably in hank-form) in an aqueous bath containing per litre 5 grams of soap and 1 c.c. of hydrogen peroxide of 130 volume strength. The temperature of the bath is then raised to 99°C. and maintained at this temperature for 1½ hours with the hank of fabric being turned at intervals to secure an even treatment. Then the fabric is removed and washed at 65°C. in a fresh bath containing ammonia (2 c.c.) and a fatty alcohol sulphate such as Pentrone T (0·2 grams) per litre. Finally the fabric is dried on a pin stenter.

An important point concerning this use of hydrogen peroxide is that it does not become absorbed into the delustred acetate fibres in the same way as does phenol and other organic substances which find use in delustring treatments. For example, when phenol is used it is often found that the finished goods retain a phenol odour which can be objectionable. It is to be noted that the process is only satisfactorily applicable to acetone-soluble acetate fibre goods (the cellulose acetate in these contains the usual 53 to 45% of acetyl groups). It has been found much more difficult to delustre the newer cellulose triacetate fibres.

[1]**Reference: B.P. 793,697**

Quality and Texture in Worsted Cloths

Photographed slightly larger than the originals for purposes of detail, the six delightful cloths on the facing page are selected from the range of worsted cloths manufactured by Alfred Brown (Worsted Mills) Ltd., Empire Mills, Bramley, near Leeds. London shrunk in every case, the brief details are as follows:—

(1) Quality 552. Botany worsted whipcord (17 - 18 ozs.), 58 - 59 ins. Available in a complete range of shades for overcoats and super quality sports trousers, etc.

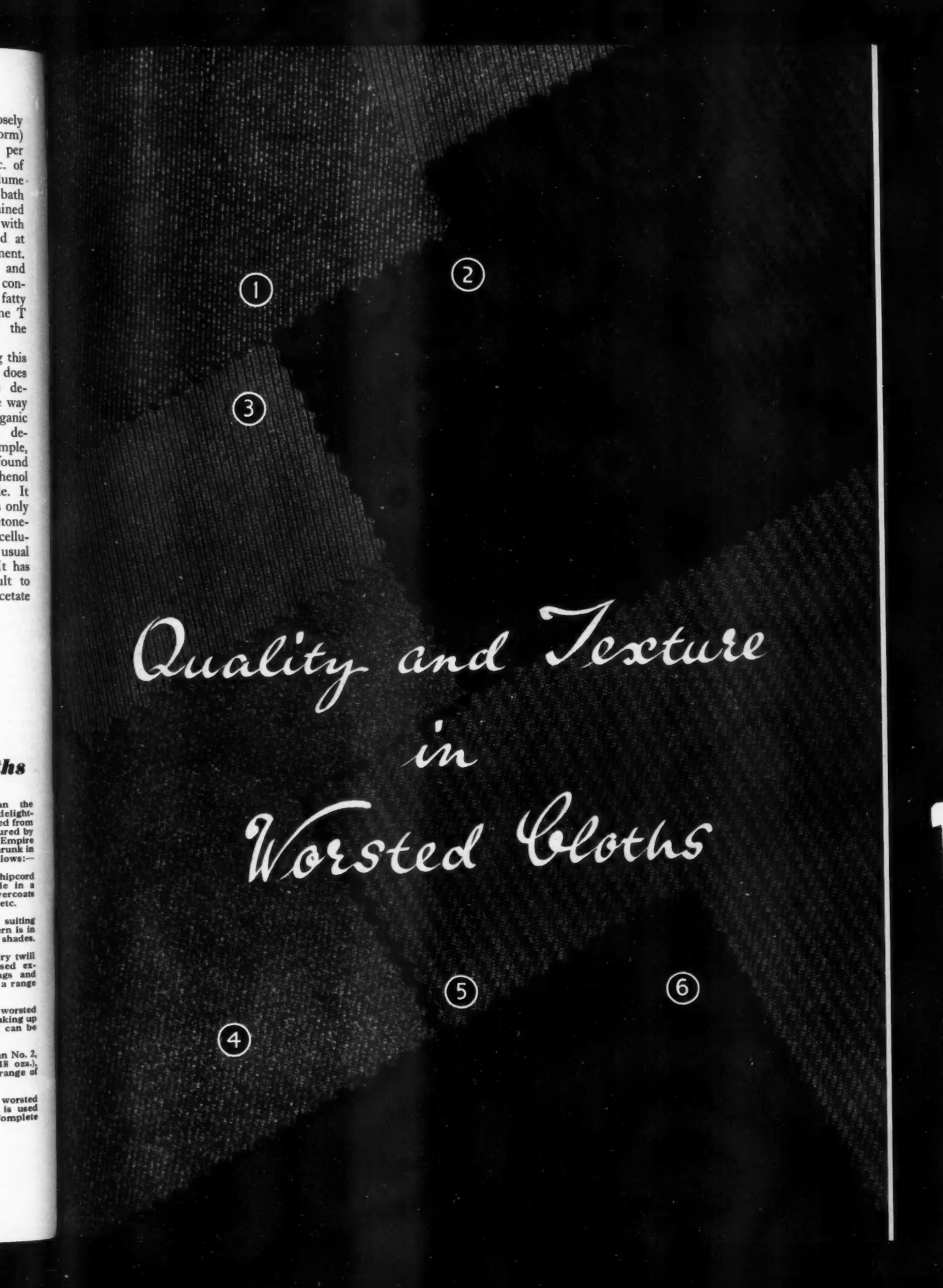
(2) Quality 568. Botany worsted suiting (17 - 18 ozs.), 58 - 59 ins. This pattern is in blue but it is available in a range of shades.

(3) Quality 503. Botany worsted cavalry twill (20 - 21 ozs.). Piece dyed and used extensively for trousers, overcoatings and uniforms, this also can be had in a range of attractive shades.

(4) Quality 527. Another botany worsted suiting (18 - 19 ozs.), 58 - 59 ins. Making up into smart suits and uniforms, it can be had in a range of smart shades.

(5) Quality 568. In a lighter shade than No. 2, this botany worsted suiting (17 - 18 ozs.), 58 - 59 ins., is also available in a range of shades.

(6) Quality 530. Melange botany worsted flannel (13 - 14 ozs.), 58 - 59 ins., is used to make better class trouserings. Complete range of shades.


Quality and Texture
in
Worsted Cloths
1
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3T

CORD Exclusive Goodyear development means stronger, thinner, more flexible transmission belting.

No splice failure
In construction the cord is wound continuously around two pulleys to produce a truly endless belt.

No ply separation
The single layer of load carrying cords round the pulley together, preventing internal stress.

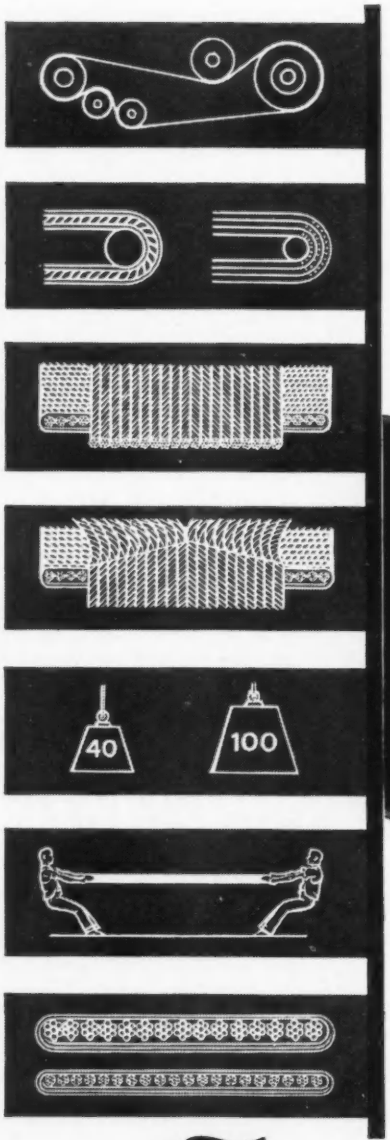
Less lateral movement
To neutralize lateral movement half the cords are twisted to the right and half to the left.

Elastic envelope
Designed to provide high friction surface to grip the pulley and transfer load to the cords.

Stronger 3T Cord
2½ times stronger than cotton and each filament of fibre is continuous, like the cord itself.

Less stretch
Triple Tempering removes surplus stretch but only to a degree where it does not hinder the flexibility of the fibre.

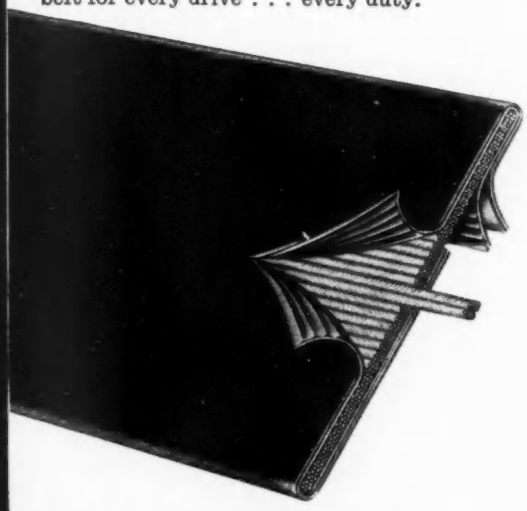
Thinner belt
3-T Cord belt is 25% thinner than belts of equal horse-power rating.



THE amazing new Goodyear 3-T cord process – successfully applied to motor car and commercial vehicle tyres – is also making transmission belts work harder, last longer and cost less for a given horsepower rating.

The synthetic cords are 'triple-tempered' – passed through a process at a controlled Tension and Temperature for a specific Time – to give them maximum strength and flexibility, minimum stretch. The result is that you can use a thinner belt – get improved flex life, longer wear, more efficient transmission and reduced maintenance.

There's a Goodyear 'job-designed' transmission belt for every drive . . . every duty.



NEW HD ENDLESS CORD BELT

The synthetic 3-T cords are *2½ times stronger* than cotton. This means longer service at lower cost on any drive. The special design of the belt eliminates splice failure and ply separation. HD Endless Cord costs no more, yet you get much higher horsepower ratings, better service all round.

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Towards a Prosperous Cotton Industry*

It is suggested that the industry needs another 3 million spindles within the next five years to give a total of 6½ million modern rings. To make up the 10 million required on single shift working in the transition period the remaining capacity of the industry today is available to give flexibility

By W. T. WINTERBOTTOM, C.B.E.†

BROADLY, the position in 1956-57 was that 863 million lbs. of yarn produced by the industry yielded a net export (i.e. exports less imports) of 41 million lbs. of woven goods and 48 million lbs. of yarn and non-woven goods, leaving 774 million lbs. for the home market. In 1958 exports of both yarn and cloth have declined still further. Home market consumption is not likely to fall and should steadily rise, both through the growth in population and an improved standard of living. Active sales promotion of textiles should also stimulate home market consumption. No substantial increase in exports can be foreseen, in spite of our most strenuous efforts; on the other hand, there is hardly any room for a further decrease.

At the time of the Working Party Report, the industry was producing yarn at the rate of 750 million lbs. a year. While production is not much different today, there have been big changes in the proportions of different fibres in the total. There has been a heavy fall in the proportion of cotton yarn, while spun rayon, mixtures and waste have increased absolutely as well as proportionally. It is important to remember that a change from one set of fibres to another does not have any appreciable effect on the total consumption of textiles in the home market, and that prosperity in our industry can be reached equally well with man-made fibres as with natural fibres.

Shape of the Industry

We have arrived at a figure of 800 to 850 million lbs. of yarn as a possible minimum requirement from the industry—say 750 to 800 million for the home market, with 50 million of net exports, mainly in yarn and thread, with cloth exports approximately balanced by imports. Of this total, about 100 million lbs. is waste yarn, leaving 700 to 750 million for the spinning industry proper. What size of an industry is needed to produce this?

The average count of yarn produced in 1957 was about 25's. There has been a definite trend towards coarser counts; in 1937 the average was 30's and in 1952, 26's. This trend, which may be expected to continue, arises largely because of the elimination of processes beyond the spindle. Final products of the industry are being designed to match processing requirements, and this helps to reduce costs of production, or at least to keep them down.

At an average count of 24's, the production of a ring spindle is 1½ lbs. a week, on single shift, so that 750 million lbs. a year would require 10 million ring spindles, or 6 million on double shift each of 38¾ hours.

It is purely coincidental that there are at present 10¼ million ring spindles in the industry but not all match up to modern requirements. Generally, frames installed since 1938 are good, since it was around that date that the large package machines were evolved. The best estimate of the number of spindles installed since the war is about 3½ million.

I suggest that the industry needs another 3 million spindles within say the next five years, which would give a total of 6½ million modern rings. To make up the 10 million required on single shift working in the transition period, the remaining capacity of the industry today is available (the residue of the old rings and the mules) to give flexibility. By the time the new rings are installed, the modern frames now in use would be due for replacement, and a continuous cycle of replacement would continue, with the obsolete machinery rapidly passing out of existence.

It is essential to move on to shift working as early as possible. New machinery is expensive and must be worked intensively if capital costs are to be covered. A target of 6 million ring spindles for a compact industry, starting from 3½ million in modern frames is reasonable, but 10 million is not, which again emphasises the need for shift working. It is worth looking in this connection at the number of hours worked in the principal cotton industries of the world. We find that in 1956-57 active spindles in the U.S. worked an average of 6,117 hours, in Germany about 4,000 hours, France 3,707, Japan 4,867, India 5,932, Hong Kong 8,158. Right at the bottom comes the U.K. with 2,124.

Within the last few weeks reference was made in one of the daily papers to the

(l. to r.) Mr. J. M. H. Grey (Cotton Spinners and Manufacturers Association); Mr. E. Hirst (Combined English Mills Ltd.); Mr. W. T. Winterbottom (Fine Spinners and Doublers Ltd.); Mr. G. D. Hughes (Sir Jacob Behrens); Col. J. B. Whitehead (Lancashire Cotton Corporation); and Mr. L. Sharp (National Union of Dyers, Bleachers and Textile Workers)

*Abstract of a paper given at the Cotton Board Conference held recently at Harrogate.

† *Chairman, Fine Spinners and Doublers Ltd.; President, International Federation of Cotton and Allied Textile Industries.*

mighty Lancashire industry taking exception to a tiny competitor whose size is only one-sixtieth part of ours. If, however, the size is related to hours worked and the relative productivity of mules and rings, we find that the proportion increases to about one-tenth, which is a vastly different matter. We are not envisaging a Lancashire industry working 7 days a week round the clock, but we must get more in line with modern industrial methods.

Now is our great chance to do this by taking immediate advantage of the technological changes which have taken place. We have to choose whether we get on or get out. Either could be a correct decision depending on individual circumstances. These figures show the industry is faced with a problem of obsolescence and not one of redundancy. This is equally true of all countries in Europe, as they now fully realise. The problem is unfortunately not quite so simple as the figures suggest; there is more to it than getting rid of the obsolete spindles and looms and re-equipping with another 3 million modern spindles and a corresponding number of modern looms. Being realists, we recognise that the problem cannot be solved by closing half the mills and running the other half, because much of the modern and old machinery is in the same mills. Whilst this will always be so to some extent, it is perhaps more marked now than it ever will be again, certainly if the right actions are taken now.

To achieve a compact and efficient industry of the right size I am convinced we must rely on natural forces. The alternative solution of an organised redundancy scheme would be in my opinion complicated, unworkable, inadequate and indefinable in its scope. Less than half the present mill structures would be needed, and at least half of those in the spinning section are either unsuitable for modern ring frames or are already in need of replacement. There must be those in the industry who would choose to go out rather than face the outlay needed to get a complete replacement, and indeed there have recently been notable examples of this, both among single units and large groups. I have a feeling that shareholders in many mills would not be altogether dissatisfied if production were abandoned before the necessity for complete re-equipment inevitably involved them in heavy capital expenditure, and surely it is obvious that if we cannot spin and weave cotton or other fibres profitably, or if we cannot adequately diversify our interests, and operations, it is better to return the capital to its owners before the worst effects of the 1920's and 1930's—that is the dissipation of capital—are repeated. This is a perfectly normal economic process. It may be presumed that those who stay are those who are prepared to use their accumulated funds for the replacement of fixed assets, and there is no case whatever for buying out at their expense the interests of those who have solid grounds for leaving. Moreover, it is equally in the interests of the workers that a compact and efficient industry should be achieved as soon as possible, because that is the only way in which they can get stability of employment.

Verticality

The pros and cons of a vertical as opposed to the present predominantly horizontal structure have been closely examined by many economists and business men. In a vertical concern, there are so many more known factors on which to base operations—where and to what extent to carry stocks, control over quality, and the ability to give quick delivery. The type and extent of verticality can, however, easily modify some of these points; for example, stock control is easier where the flow extends right up to the final consumer than where it goes to other processes first, such as finishing and converting.

The argument about lack of flexibility has much weight. If demand for a specialised product falls in a period of poor trade it is less easy for the vertical concern to switch to more active markets, and it may well be faced with a period of acute depression. For this reason, I am doubtful whether a completely vertical structure is right for our industry. One of the main reasons why some of the most successful single unit mills in Lancashire have kept to the horizontal set-up is that they have retained a high degree of versatility and have deliberately equipped and balanced their mills for it.

Changes in the Buying Pattern

This has brought about a significant change in the selling side since the war which has an important bearing on the size and structure of the industry. By the big buyers, I mean the chain stores, mail order houses, government departments, hospitals, railways and coal mines. These large consumers can enter the market when they choose, often with enormous quantities of goods to buy. The chain stores and mail order houses place their orders in the usual way, the others usually by tender. Other things being equal, the orders tend to go, quite rightly, to the cheapest source, but with the essential difference from smaller buyers that the pressure on individual firms to take these orders at almost any price is much greater because of their sheer size. A weaver can perhaps afford to miss an order to 25,000 yds. if the price is not attractive, but he has to think very seriously indeed before he refuses one in the hundreds of thousands.

The power of the bulk buyers can have more serious effects on a declining industry, where there is essentially a general shortage of trade, than on one which is stable in the sense of being in balance with the market, and if this power is used indiscriminately it can well break the spirit and add to the general confusion of the industry. Even the firms who take the orders may be dissatisfied with the prices; those who take a stand and refuse them may well be forced out of business. A firm which went to the extent of equipping itself specially for this kind of mass production would be so afraid of being forced on to piecemeal work that it would be strongly tempted to cut its prices below the economic level.

We have to accept the fact that the bulk buyers are with us, and what is more, their share of the trade is growing. Our best policy to meet the situation is to rationalise at a size and an efficiency where we are no longer so vulnerable as we are today, for in a stable and balanced industry the existence of these large buyers has a very different aspect, providing as they do the means for ensuring longer runs of production. I believe the bulk buyers are as well aware of their responsibilities as we are, and certainly if there is not a high degree of "give and take" we are heading either for nationalisation, which would help nobody, or for a fierce struggle with our customers. What is more, the producers cannot be blamed for acting jointly on this problem if they see the retail trade making vastly greater profits in relation to the capital employed than they make themselves.

The most serious danger of the bulk buyers is perhaps that if they should decide to support a policy of buying from the Commonwealth rather than from Lancashire, the effect on the home industry could be catastrophic. On the other hand, if we are to accept the idea of a free economy, agreement over the limited field which has been the subject of recent negotiations cannot be regarded as the final answer to this problem. First we had Indian goods in our home market, then Hong Kong, then Pakistan. Is the queue to continue with East Africa, the West Indies, Nigeria, Ghana?

We must rationalise our industry if we are to have reasonable prosperity for all concerned. Price management helps to even out the highs and lows in our activity, but there are limits to the stresses under which it can continue to operate. It has been suggested that our industry is too versatile, because spinners—and manufacturers—seem to drop like a swarm of locusts on a particular section of demand, strip it clean, and then hungrily look around for another green patch. I do not think this is attributable to our versatility but is just another symptom of an oversized industry.

There is no redundancy problem in the sense that there is no surplus of the type of machinery which is needed to meet the challenge of the future. But there is, in this sense, a considerable degree of obsolescence, and not only in the U.K. Much pruning needs to be done and, until complete, we shall have an untidy, unbalanced and unhealthy industry.

The basic question is: "Has the industry got a future." Men of widely different temperaments—progressive, moderate, and conservative—have shown clearly that they think it has. It is only since the unrestricted free entry of Commonwealth goods that any doubts have been cast on the answer to this question. There has been a variety of opinions on how the position should be corrected, but all are aimed at ensuring a reasonable degree of stability that would lead to prosperity.

Stability, of course, can be reached only in relation to an available market, and in our industry this is dependent on some form of protection in the home market from competition from industries with "rice-standard" wages.

New "Perspex" Diffuser Fitting

A.E.I. Lamp and Lighting Co. Ltd. have added a 5 ft. fluorescent diffuser fitting to the commercial section of their range. The F.1232 (with switch start) and FX.1232 (with switchless start) each has a plain 040 opal "Perspex" diffuser of elliptical section with black "Perspex" ends and fits the standard A.E.I. single or twin-lamp fluorescent power pack. The diffuser is attached to the power pack by a wide-lipped cover and it may be easily removed or allowed to hang freely from one side when re-lamping the fitting.

Changes in Marketing and Distribution of Textiles*

An outline of some of the factors directly or indirectly affecting spinning and manufacturing such as changes in retailing, in the functions of the wholesaler, in the organisation of Lancashire, and changes in fibres and technology

By E. KANN, PH.D., F.R.I.C.†

AS a consequence of the loss of so many export markets—the home market is now the most important customer. About 75% of the total production goes into this market—against only 50% before the war. The structure of the home market, its peculiar demands and problems is therefore of vital importance. In the last 20 years, our population has trebled its spending on goods and services. Much of this increase, of course, has been due to prices, but, in real purchasing terms, about one-sixth more is now spent on goods and services of all kinds. Spendable income is much more evenly spread.

Another significant change is in the age composition of the population. We have about 1½ million more infants and children than in 1939. This post-war bulge is now entering the age group which is of the greatest importance to the textile industry; by 1967 the number of young men and women between 19 and 29 years of age will be over a million higher than it is today.

The housing programme, which has resulted in the building of 3 million new houses since the end of the war and which is still continuing at a high rate, is another important factor. The furnishing of these new homes has opened up considerable possibilities. Against this background it is somewhat disappointing to find that the annual home market consumption of woven cotton and man-made fibre textiles has remained near the pre-war level of about 2,000 million yards. It was 2,150 million yards in 1957, but of this, unfortunately, over 300 million yards were imported. Similarly, it is significant that the proportion of total expenditure which went to clothing has, since 1938, remained fairly constant between 8 and 9%. This seems to indicate that the industry has failed to take full advantage of the increase in purchasing power. This is, of course, also due to the great competition from motor cars, radio, television and electrical appliances, all of which enable our people to enjoy the greater amount of leisure for which they have been striving.

The fundamental question which arises from these unpalatable facts is, to my mind, whether you are producing in sufficient quantity and variety the right kind of textiles to tempt our population to spend more of their money on your products.

Changes in the Functions of the Converter

The success of the large scale garment manufacturer depends much upon the ability of the converter to provide him continuously with new ideas in fabrics and designs. The whole outlook of this industry is dictated by the desire to follow closely the *haute couture*. It demands, therefore, from the textile industry a much greater awareness of these trends and a greater flexibility in translating them into fabrics which can be mass-produced.

Thus a challenge for a more modern approach has been made upon the traditional system of design, colour and style creation of the piecegoods trade. As we all know, this sector of textile production has been following a rather conservative pattern and has shown for many years a declining trend. In fact, the printed or dyed fabrics which interest the modern garment manufacturer can no longer be considered in the same category.

There are two other considerations. Many garment manufacturers have increased the demand for their products by the development of their own brands of quality. These are highly advertised, and their fashion element is emphasised and is increasingly brought before the public. Consequently, the garment manufacturers are only interested in fabrics, designs or colours which can be confined to them. The production of these fabrics is a highly specialised operation. It requires an amount of co-operation at the earliest stages of fabric and design development unknown hitherto. The merchant converter and the textile producer have also to recognise that the speed of making-up machinery exposes fabrics to quite new strains and stresses. In general, a much higher quality is required for such fabrics. Any interruption of the flow production in garment manufacturing results in considerable losses of efficiency.

Emphasis on Fashion

But it also requires, on the part of the merchant converter, a lively reaction to trends, great skill, good taste and a flair for fashion, which cannot be acquired easily. Many of our leading converters possess this ability to a high degree and produce most attractive ranges which show an appreciation of the improving taste of our population. But when one looks at certain ranges of British prints compared with Continental productions, one sometimes cannot escape the notion that some of them are rather conservative and somewhat unimaginative in colour. Of course this may be due to the fact that our climate and sky require a different colour palette. But with the impact of travel, and the

Photographed leaving the conference hall (l. to r.) Mr. A. Wilcock (H. Christie Ltd.); Mr. G. Worrall (Bradford Mill); Mr. D. Grogan (Asia Mill); Mr. A. B. Johnson (Ash Mill (Shaw) Ltd.); Mr. B. Holden (B. and E. M. Holden Ltd.); Mr. J. L. Butterworth (Ash Mill (Shaw) Ltd.); and Mr. A. O'Neill (B. and E. M. Holden Ltd.)

* *Abstract of a paper given at the Cotton Board Conference at Harrogate.*

† *Director, Marks and Spencer Ltd.*

influence of international fashion, one often wonders whether our conception is not somewhat narrow. Otherwise it would be impossible for so many Continental and American prints and fabrics to find their way so readily into the home market, in spite of the considerably higher prices caused by import duties and other charges. Our public has been very quick in appreciating a more fashion-conscious approach to styling and colouring in their clothes. But have the creative forces within the textile industry gone through the same rapid process of education?

It is evident that our ability to compete in the Home Market, as in other markets, depends to a large degree on a satisfactory answer to these questions. When it comes to fashion apparel and women's outerwear we all know that it is not the last penny in the price of grey cloth that really matters. Women buy what they like! The biggest inducement for them to purchase is not the price, but the fashion-attractiveness, of a garment. This applies as much in the home market as anywhere else.

One often hears the excuse—how difficult it is to sell modern designs and colourings to the trade. In my view this is entirely disproved by the success of our modern units of garment manufacturing and by certain experiences in retailing.

Changes in Retailing

Due to the peculiar horizontal structure of the textile industry, there are many stages between the manufacturer and the final consumer of textiles, whether they are purchased in the form of made-up clothes, knitted goods, furnishings or household textiles. It is, therefore, of great importance to spinners, weavers or converters that—as in your own efforts—the greatest possible efficiency is brought into all the subsequent operations of converting your "semi-finished" products. The last stage in this long chain is retail distribution and much of your success obviously depends upon its efficient functioning. The last 20 - 30 years have seen the rapid growth of new forms of retailing. The distinctive contribution of the multiples and chain stores, and recently of the mail order firms, to the problems of distribution has been, particularly since the end of the war, the introduction and continued improvement of new techniques of buying merchandising and selling. These new techniques have attracted an increasing number of customers, especially in the clothing field.

Specification Buying and Planned Production

As already pointed out, the retailer is in much closer contact with the millions of men and women who buy textiles than the industry. The distributor, therefore, has a wealth of knowledge of the requirements of the public, which—if properly interpreted—can enable him to take a constructive part in the planning of future requirements. In a way, every shop or store is a laboratory in which to experiment and test the reaction of the public to the goods offered to them. An enormously complex problem is how to feed back that consumer reaction to the industry and translate it into technical terms of future production. It is exactly in this field that modern retail organisations have made real progress.

There are several important considerations which have stimulated this new approach. The scientific analysis of consumer demand, particularly in the middle strata of incomes, has shown that it is possible to introduce a certain amount of standardisation of basic raw materials—i.e. yarns or fabrics—into the manufacture of clothing of all kinds. In the subsequent operations these raw materials can be converted flexibly, and with imagination, into attractive garments. There need be no fear of uniformity.

There is another sequel to this simplification. The channeling of demand into fewer production standards of basic materials is bound to increase the quantitative demand for each of them. Lesser changes of machinery, and fewer stoppages for changeover, must result in definite economies of production and improvements in quality. The conscientious buyer of textiles is, therefore, in a position to use his influence consistently to improve the quality of his specifications. With his intimate knowledge of the requirements of the consumer, he can see to it that the manufacturer incorporates in his production those small improvements which, at little extra cost, can upgrade the quality of an article and improve its performance in wear; thus making it much more valuable to the ultimate consumer.

Changes in the Functions of the Wholesaler

So far, I have only spoken of some of the developments in the larger retail organisations. I recognise, of course, the importance of the many thousands of smaller and independent ones. A very large percentage of the total textile business is handled by them. Some of their problems have recently been discussed in the report of the Co-operative Independent Commission. In their view, the large retail organisations in many cases have replaced the independent wholesaler, and have integrated, in the course of the years, the wholesale function into their own buying operations. Whilst the large retailer has become less dependent on the wholesaler, the thousands of smaller and independent retailers could not function properly without him. There can be no doubt that the wholesaler forms an integral and important part of the economic process of distribution. But it appears that there should also be a reconsideration of his functions in the light of the changing circumstances of our economy. What the industry, as well as the smaller retailer, now need are wholesale organisations which are prepared to play a greater part in the creation of new lines and their forward planning with the producers. In this way the independent retailer could match the buying power and technical expertise developed by the big buying organisations. A similar development has already been envisaged in the 1945 report of the post-war planning committee of the Wholesale Textile Association. With great foresight, it underlined the necessity for a far greater degree of planning between wholesaler and manufacturer. It stated that it would be desirable that the wholesaler, with his intimate knowledge of trends in the retail demand, should anticipate the requirements in conjunction with the manufacturer and determine well in advance of the season what goods should be produced.

In America and some Continental countries, this new approach to wholesaling seems to be well advanced. There are many such organisations who combine their planning of production, on the one side, with a much deeper interest in the merchandising activities of their retail customers on the other. They advise them on the best methods of merchandising, stock control, display, etc.—and, in turn, take a responsible part in the creation, production and procurement of merchandise which they feel their retail customers ought to buy.

Changes in the Organisation of Lancashire

I understand that about 70% of all looms in Lancashire are now controlled by firms with an interest in converting, and many of these are spinner-doubler-weaver integrations as well. There are some important combinations of printers and converters, who are probably in a more flexible position to meet the quick changes in fashion. Some of your leading weaver-converters have gone most successfully into garment manufacturing.

Some have even extended their interests into the retail distribution of ladies' outerwear. Many of the weaver-converters have taken over wholesale functions in their own selling operations, especially in household linen and furnishings, feeling that in this way they will be in a better position to gauge and anticipate the potential demand of the retail trade.

All these developments show, in my view, the desire to find more efficient methods of distribution in order to stimulate the demand for your goods. It would appear necessary for manufacturers to examine closely their selling policies. Encouragement ought to be given to those forms of distribution through which goods can reach the consumer in the most efficient and inexpensive way.

Changes in Fibres and Technology

The cotton industry in all its phases has adapted itself with remarkable flexibility to the use and processing of the chemical fibres. A multitude of new products and blends have been developed which created in their final make-up a new undreamt-of conception of easy living. Their use has been so integrated into your operations that the old borderlines between the various fibres have practically disappeared. Nor have the older fibres been idle. Prompted by the competition of the new man-made synthetics, the industry has succeeded in developing new processes, treatments and finishes which can impart in the older fibres some of the properties of the new ones. You have widened the application of resin finishes and staged the amazing come-back of cotton into the dress, outerwear and shirting fields.

A host of new dyestuffs are available to change the appearance of dyed and printed cloth, and to give them that fresh and casual look which our generation wants. Printing methods and techniques have advanced. Important developments of new machinery in spinning and weaving have contributed to the greater efficiency of your productive techniques. There is a new atmosphere in your labour relations and a better understanding seems to be emerging of the necessity for two or three-shift production. Thanks to our universities and research institutes, a new generation of scientists and technologists has entered the industry. They have brought an entirely new approach to the problems of production and process control.

Textile Institute Conference

Stress-Strain-Time Relationships of Non-Uniform Textile Materials*

By P. KENNY and M. CHAIKIN

IT has long been recognised that a useful method of investigating the structure of high polymers is to observe experimentally their mechanical behaviour on deformation. Changes in this behaviour, as a consequence of changing ambient conditions and of the application of specific chemical reagents, have provided information on concomitant changes in structure. The study of any mechanical property provides useful data in this connection, and, in the past, preference has been given to the measurement of those properties which are simple to determine experimentally and simple to analyse mathematically. A natural consequence of this approach has been the universal attempt to choose or manufacture dimensionally uniform specimens—sufficiently uniform, that is, to engender the hope that any non-uniformity present has little effect on the stress-strain-time relationship. Where this has been realised, it is because the effects have remained within the limits of experimental error, yet such a procedure always defeats the principle of random sampling, which can be important with some textile materials. In addition, studies of the rheological behaviour of textile materials in processing and end-use, data must be obtained of the actual performance of specimens which vary widely in their uniformity. Chaikin has made a preliminary and limited theoretical approach in studying the longitudinal stress-strain properties of conical fibres, and Banky and Slen, by measuring the extension of longitudinal segments, have been able to show how the non-uniformity of wool fibres can affect their load-extension curves. The case of a cone in torsion has been treated by Peters.

It should be pointed out that, besides the irregular shape of specimens, the inherent non-uniformity of the polymer substance itself may be of some importance, and this is particularly true with textile materials. Before structural non-uniformities can be investigated, however, it is essential to have prior knowledge of dimensional influences on stress-strain behaviour.

The paper is a mathematical analysis of the effect of cross-sectional area variability on several common stress-strain-time properties, and keratin fibres have been chosen as an illustration of the approach. It should be emphasised that similar mathematical procedures could be employed to study not only other rheological phenomena, but also any other dimensionally non-uniform material. A further consequence of the present work should be to enable the use of such procedures to advance our knowledge of the structural irregularities of single fibres and the mechanical behaviour of textile assemblies.

It is advantageous to distinguish at the outset the difference between the stress-strain-time behaviour of the material composing a specimen and that of the specimen itself. For investigations into structure, only the former is of significance, and therefore non-uniform effects must either be eliminated or accounted for. For technological investigations into mechanical behaviour, however, the dimension of the specimen is usually of great importance.

The approach taken was to develop, from a generalised mathematical theory of a non-uniform textile specimen in longitudinal tension, the specific cases of a conical specimen and a specimen with normally distributed cross-sectional areas along its length. However, any known cross-sectional area distribution can be considered, and this is illustrated. In order to facilitate the development of the theory, the following assumptions were made.

(1) The stress distribution in the specimen is that corresponding to a specimen in simple tension, i.e., the principal stress component P_{zz} is the load on the specimen divided by its original cross-sectional area at the point z along the specimen, all other principal stress components approaching zero.

(2) The only principal strain component is e_{zz}, all others approaching zero, i.e., Poisson's ratio $(R) \rightarrow 0$, which, although incorrect for textile materials, does not invalidate the conclusions reached of the effects of non-uniformity.

(3) The stress-strain-time relationship, characteristic of the material composing the specimen, is uniform throughout the specimen and is unaffected by dimensional differences.

These assumptions permit the summing of extensions of elementary cross-sections that occur along the length of the specimen. It is then possible to evaluate the complete extension of the specimen by noting that the extension of an elementary cross-section is proportional to the normal traction and inversely proportional to its original cross-sectional area.

Abstract of a paper given at a conference recently held at Gothenburg, Sweden, organised by the Textile Institute, Manchester.

New Antifoaming Agent

Claimed to be the lowest priced silicone defoamer on sale today MS Antifoam Emulsion RD, marketed by Midland Silicones Ltd., 68 Knightsbridge, S.W.1, is a highly dispersible oil-in-water emulsion which disperses quickly in cold water or may be added direct to a foaming system without dilution. As well as having excellent thermal stability, it is effective in small concentrations and economical in use. Antifoam Emulsion RD is the result of numerous tests and experiments carried out at the company's research laboratories at Barry, and at various factories throughout the country. Owing to the great variety of foaming problems it is necessary to determine the optimum concentration for any system. In practice concentrations between 10 and 500 parts per million are used, and 200 parts per million is suggested as a starting point for trials. Antifoam RD will find uses in the adhesive, paper, paint and varnish, rubber, metalworking, soap and detergent, textile and chemical industries.

Textile Institute Conference

Tensile and Tearing Strength of Cotton Cloths*

By H. M. TAYLOR

TENSILE strength and tearing strength are discussed and a relation between cloth tensile strength, yarn strength and the parameters of cloth construction and yarn construction is suggested. Tearing strength is shown to be dependent mainly on the spacing and strength of the threads being torn and the force required to make them slip over the crossing threads. Experimental results are given to illustrate the validity of the relations derived from theoretical considerations.

Constructional Features Affecting Cloth Tensile Strength

Each of the constructional features of a woven cloth has its effect on the tensile strength of a cloth. The following is an attempt to present some of the more important relationships between construction and strength.

The most important factors are clearly the total quantity of cotton in the direction under test and its quality. The integral strength of the fibres in a cross-section of the cloth gives an upper limit to the strength that could possibly be expected. Gregory shows that the realised strength of a fabric is only about 50% of this strength. A second approach may be made through yarn strength, on the assumption that the cloth strengths might be approximately equal to the integral strength of all the yarns in the direction tested. Experience shows that the strengths of cloths of common constructions usually lie between 85% and 125% of this, although examples of more extreme variations are by no means unknown. Clearly, the integral strength of the yarns is likely to be a more useful guide than fibre strength.

Strength of a Band of Threads

Consider first the test specimen from which all the crossing threads are imagined to have been removed, the longitudinal threads being gripped as a band between parallel jaws. As the jaws are moved apart, the threads fail one by one in order of extensibility, the least extensible first. The maximum load recorded is also the maximum load that could be applied to the band of threads in a constant-rate-of-loading tester, and therefore it is reasonable to describe it as the strength of the band of threads.

Table 1 shows the strength per thread of a band of threads expressed as a ratio to the single-thread strength, calculated for different values of the variability of the yarn breaking extension.

Table 1

Coefficient of Variation of Single-thread Breaking Extension	Ratio of Band Strength per Thread to Average Single-thread Strength
4	0·90
8	0·83
12	0·77
16	0·71

The coefficient of variation of single-thread breaking extension of cotton yarns is commonly about 12%, and, at this level, a band of threads might be expected to have a strength of only about 75% of the integral strength of the threads. In practice, the strength of a cloth strip is nearly always considerably greater than this and the difference must be ascribed to the presence of the crossing threads.

Effects of the Crossing Threads

The presence of these threads has three effects:—

(1) It tends to localise the rupture, thus modifying the simple theory of the strength of a band of threads.

(2) It causes the crimping of the longitudinal threads so that they do not lie continuously in the direction of stress. The crimp of the threads gives rise to the distortion of the specimens (waisting) during testing, which may have important effects on the test result.

(3) It increases the binding of the fibres in the individual yarns, thereby increasing yarn strength.

Effects of Variations in Threads per Inch and Yarn Counts

The variables of cloth construction to be considered are weave, threads per inch and yarn counts. Generally speaking, an increase in the density of a weave, by improving fibre binding, will tend to improve cloth strength, relative to yarn strength, but, if the yarns are already very well bound, as is the case with folded or highly twisted yarns, the effect may be small, and it may be offset by the accompanying increase of yarn crimp.

Effect of Weave

Since the fibre-binding effect is derived from the mutual pressure of the yarns, it is to be expected that the strongest weaves would be those with the greatest number of intersections in the weave repeat, that is, the simple weaves such as plain, and 2/1 twill.

A selection of 21 of these cloths has been made, choosing those that had the same lifting sequence for all the ends or all the picks. The cloths have been classified in the first part of Table 2 according to minimum float length of the threads in the direction tested, and the results averaged for each minimum float length. The cloths with plain intersections have been further classified in the second part of Table 2 according to the length of float between plain intersections.

Table 2

Percentage by which Strength of Cloth exceeds Strength of Band of Threads

	Warp	Weft
Minimum float length:—		
1 thread	10	61
2 threads	2	30
3 threads	0	25
4 threads	−3	—
Cloths with plain intersections:—		
Length of float between intersections:—		
1 thread	14	67
2 threads	12	64
3 threads	10	63
5 threads	11	50
11 threads	0	38

Tearing Strength in Relation to Cloth Construction

While it is possible to predict the strength of a cloth from a knowledge of its construction with a useful degree of accuracy, any forecast of tearing strength is likely to be much more approximate. The chief reason for this difference is that while the stress distribution in the cloth during strength tests can be assumed without too great an error to be uniform, this is by no means the case in cloth which is being torn. Any complete analysis of stress distribution would have to take into account the relations between stress, slippage and distortion, and it

Abstract of a paper given at a conference recently held at Gothenburg, Sweden, organised by the Textile Institute, Manchester.

Table 3
16 Plain Cloths

Fabric	Threads per inch		Crimp %		Tensile Strength lb./2 ins.		Tongue Tearing Strength lbs.		Single-thread Slippage Force g./¼ in.	
	Warp	Weft	Warp	Weft	Warp	Weft	Warp	Weft	Warp	Weft
A ..	158·4	36·9	6·4	1·6	217	29	—*	3·8	55	31
B ..	158·4	57·1	11·6	2·2	216	54	—*	3·2	207	138
C ..	158·0	49·5	9·5	2·9	231	47	—*	3·0	160	93
D ..	157·5	61·7	12·1	2·7	225	67	—*	3·0	232	190
E ..	145·0	43·1	7·4	1·5	211	35	—*	3·2	81	50
F ..	145·3	67·3	12·7	2·9	195	68	—*	3·1	229	175
G ..	143·8	57·6	10·8	1·8	195	50	—*	3·2	164	81
H ..	145·6	72·8	14·7	3·2	187	74	—*	3·0	306	214
I ..	128·4	82·3	16·8	3·2	163	98	—*	2·7	378	207
J ..	127·9	72·2	12·5	2·8	174	77	5·7	3·2	189	143
K ..	129·4	88·3	15·1	3·2	153	107	5·5	3·1	373	268
L ..	128·0	53·7	7·6	2·8	178	48	6·6	3·3	86	83
M ..	98·6	103·6	10·2	8·8	117	134	4·2	3·6	355	194
N ..	97·8	83·9	12·3	6·4	124	90	5·5	3·4	181	132
O ..	98·6	97·0	8·7	8·2	117	116	4·6	3·7	231	192
P ..	95·2	61·7	10·2	5·8	115	53	5·9	3·0	118	76

*— denotes a "tail-tear."
Warp counts: 30s Weft counts: 32s

Table 4
8 Cloths in Different Weaves

Weave	Threads per inch		Crimp %		Tensile Strength lb./2 ins.		Tongue Tearing Strength lbs.		Single-thread Slippage Force g./1 in.	
	Warp	Weft	Warp	Weft	Warp	Weft	Warp	Weft	Warp	Weft
Plain ..	80·2	77·6	8·8	7·3	105	133	5·1	6·3	436	506
Poplin ..	114·6	56·8	13·0	2·7	166	93	7·4	5·2	780	440
Oxford ..	122·8	62·7	5 5	6·7	172	92	10·9	6·3	234	223
2×2 Matt ..	119·6	62·5	4·7	2·9	176	63	19·8	16·3	134	106
Sateen ..	82·2	118·2	2·2	6·6	101	184	19·1	25·3	68	58
Honeycomb	122·2	77·2	8·9	8·7	159	111	14·2	13·4	113	108
2/2 Twill ..	119·2	71·0	7·2	4·6	182	84	11·0	5·4	150	148
3/1 Twill ..	119·0	71·1	8·8	4·5	180	108	12·1	9·4	153	121

Warp counts: 28s. Weft counts: 32s except Matt fabric: 44s.

The single-thread slippage force is the force required to draw a thread from a strip of cloth 1 in. wide.

Table 5
Comparison of Single and Double Picks in a Shed

Fabric	Threads per inch		Tensile Strength lbs./2 ins.	Ballistic Tearing Strength lbs.	Single-thread Slippage Force g./½ in.
	Warp	Weft	Weft	Weft	Weft
Single picks per shed					
3/1 Twill ..	89·5	70·4	254	6·6	404
	88·1	61·2	257	8·1	243
	88·2	50·1	193	9·8	106
2/1 Twill ..	78·8	62·7	274	5·3	405
	77·4	53·2	207	6·0	264
	76·6	43·9	154	7·6	158
Plain ..	70·7	53·7	225	4·4	526
	71·0	48·1	190	4·6	417
	69.7	41.9	159	4.7	243
Double picks per shed					
3/1 Twill ..	91·6	92·4	348	18·5	319
	90·8	81·2	305	20·4	245
	90·6	67·8	223	—*	116
2/1 Twill ..	77·4	79·1	299	11·6	341
	78·0	70·7	269	19·5	236
	77·6	60·3	210	25·5	179
Plain ..	70·6	76·1	284	7·4	659
	69·5	68·8	261	4·6	490
	69·4	60·1	231	9·8	323

*—Tearing strength was beyond the capacity of the machine.
Warp counts: 12s Weft counts: 10s
The single-thread slippage force is the force required to withdraw a thread from a strip of cloth ½ in. wide.

would be necessary to know how these characteristics are related to cloth construction and finish. It would also be necessary to know how the strength of the yarn during this test is related to its strength tested as a single thread and to its construction. An investigation has been made into the relation of tearing strength, as determined by the single rip or tongue tear methods, yarn strength, thread spacing and ease of thread slippage.

Tongue and Rip Tests—Experimental Results

Tearing tests by the tongue tear method were made on 16 experimental plain cloths. Table 3 sets out the constructions, tensile strengths and tearing strengths of these cloths.

Further evidence on the usefulness of plotting the quantities discussed is obtained from test results for 8 cloths of different weaves, all woven from the same yarns. The particulars of these cloths are given in Table 4. The setting of the threads was varied to give roughly the same texture to each cloth. For example, if the sateen had been woven with the same number of threads per inch as the plain, it would have been limper and more open, and the increase of thread density was made to rectify this.

A more systematic comparison of cloths containing single picks against cloths of similar construction containing double picks is shown in Table 5.

On the basis of the foregoing observations, it is permissible to draw certain conclusions. The important factors determining fabric tearing strength are (1) the single-thread strength of the yarn, enhanced by the binding effect of the woven structure; (2) the number of threads per inch in the direction of tearing; (3) the resistance to slippage of the torn threads calculated as fs/n where fs is the force to cause slippage over n cross threads; and (4) the distance by which the cross-threads may be moved together under the conditions of the test. To these must be added a fifth variable, the number of picks in each shed, or the number of ends running together. The effects of variations in weave appear to be covered, apart from the special treatment required for matts. It seems very likely that at least two other factors have some influence on tearing strength, namely, the resistance of the cloth to distortion and the resistance to slippage of the cross-threads, but the results so far obtained do not show their independent effects.

It is not possible, as yet, to predict from purely structural data the expected tearing strength of a cloth. It is also affected by finish, scouring increasing, and lubricating reducing, it. The magnitude of this effect may be very considerable, e.g. a loomstate canvas that had a warpway tear strength of 38 lbs. by the tongue method, showed a tearing strength of 45 lbs. after lubrication with paraffin wax and 22 lbs. after thorough extraction.

"Unifil" Winders

A rapidly broadening usage of the "Unifil" loom winder system of weft preparation is being evidenced, according to Universal Winding Co., through the recent receipt of substantial orders from mills who have been operating evaluation quantities over the past year. Several textile companies are now installing sufficient quantities of Unifils to fully equip their entire weave rooms. Mills who recently placed orders for additional "Unifils" include Cone, Burlington, Woodside, Dover, Ponemah, and Richard Textiles. While the majority ordered to date have been for installation on looms weaving filament and spun synthetic fabrics, more interest has been shown recently in "Unifil" for application to cotton looms. Universal also report that, by this year's end, "Unifils" will be installed and operating in 45 mills in the U.S. and in a few mills in other countries.

New Dyestuffs Plant

It is reported that a plant costing £800,000 for the production of dyestuffs is to be built at the works of Clayton Aniline Co. Ltd., Manchester. It is due to be completed by mid-1960. The plant will be engineered and constructed by Humphreys and Glasgow Ltd., London, to utilise processes held by Clayton Aniline Co. Ltd.

Some Mechanical Properties of Viscose Rayon Fabrics

By T. EEG-OLOFSSON

AT the Swedish Institute for Textile Research, an investigation concerning the mechanical properties of fabrics has been going on since 1954, its purpose is to find out how to produce at a minimum cost the fabric which behaves best mechanically for a certain purpose.

It was necessary to decide from which point of view the investigation had to be started. The wearing apparel point of view was chosen as the most interesting one, because in this case the deformations in practical use are normally very complex. The basic deformations resulting from stretching, bending, shear, etc., instead of occurring separately, are usually combined.

As the research was intended to be a basic scientific study, it was necessary to use precise well-designed instruments, and make new instruments and to try new methods. Some of these instruments and methods are described together with results from measurements made on viscose rayon fabrics. The viscose rayon fabrics consisted of twenty-five designs woven in one piece from 120/30 den. or 13–30 Tex. yarn (twist 1 turn per cm.) in warp and weft.

Bending

In the new instrument (Fig. 1), a homogeneous test specimen is bent by a couple and thus is deformed to an arc of a circle. The corresponding values of bending moment and curvature are measured, and the flexural rigidity is found from the fundamental Equation. Thus, all complicated mathematical computations and simplifying assumptions are avoided.

The test specimen is held by the clamps C_2 and C_2. C_2 is fixed to the tripod, C_2 floats on mercury. In order to attain a bending moment which can easily be varied and measured, the clamp on the float carries an electrical moving coil. This coil can rotate about a vertical axis in a magnetic field set up by permanent magnets and a core. When current flows, the coil will behave like the coil in a moving coil galvanometer. The spindle is replaced by the test sample itself, and the bending moment of the sample replaces the stabilising moment of the galvanometer springs. The bent sample takes the form of an arc of a circle, thus the float must be able to move sideways, which explains why the spindle and bearings could not be the same as in a galvanometer. The radius of curvature depends on the bending moment, which can be varied by varying the current through the coil. As the moment is proportional to the current, it is easily determined by means of an ordinary milliammeter. The curvature is read as the angular deflection $\propto^{\circ}$ of the coil.

Experiments on Flexural Rigidity

In Fig. 2 the flexural rigidity of the viscose rayon fabrics is plotted against number of threads per cm., and the stiffness values of the weft and the

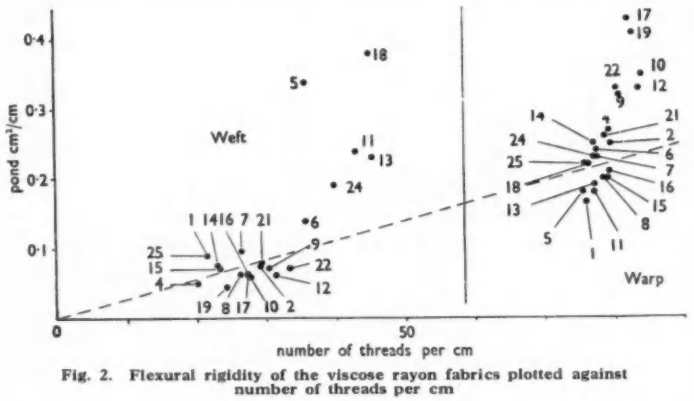


Fig. 2. Flexural rigidity of the viscose rayon fabrics plotted against number of threads per cm

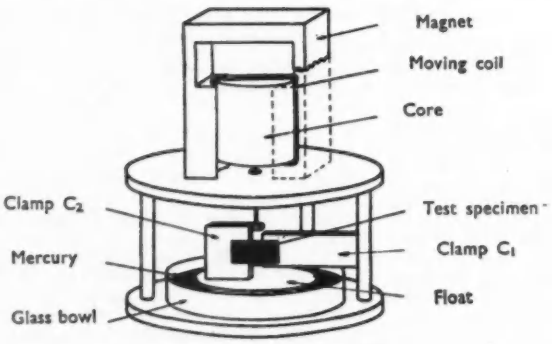


Fig. 1. The new instrument

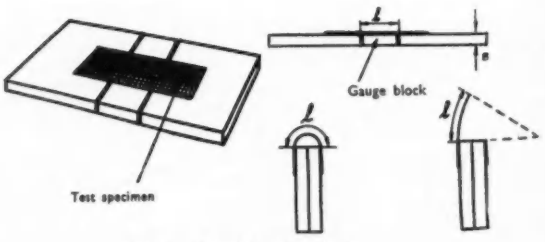


Fig. 3. Principle of method

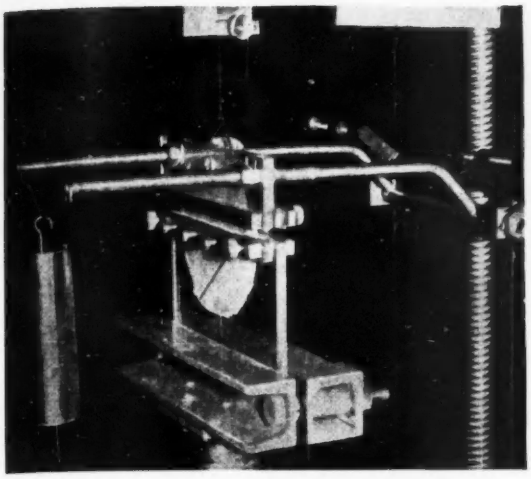


Fig. 5. A photograph of the measuring device adapted for use in an Instron tensile testing machine

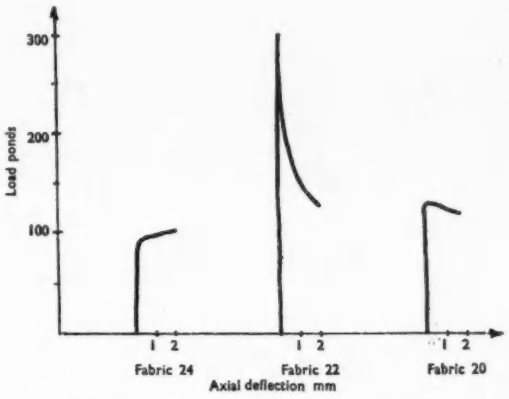


Fig. 6. Three typical load-deflection curves in the warp direction

warp are seen to form two groups. If the stiffness of the fabric were merely proportional to the number of threads per cm., all stiffness values would lie about a straight line, shown in Fig. 2, corresponding to the stiffness of the yarn taken directly from the cone. But, instead, the points in each group suggest an upward deviation from the straight line when the number of threads per cm. is increased.

Recovery from Bending

A complementary method has been devised by which small samples may be deformed to a constant curvature for an arbitrarily long time, and, after unloading, the recovery can be followed for as long a period as desired.

The principle of the method is shown in Fig. 3. The test specimen is fixed to two plates kept at a distance l apart by means of a small gauge-block. The thickness s of the plates is the same as the required radius of curvature. The two plates are then brought together. The length l is made equal to $\pi.s$ and the specimen therefore forms a semi-circle.

After the specimen has been kept in the form of the semi-circular arc for the required period, it is cut along one of the plates, and then takes the shape of an arc of a circle. The radius of this circle increases with time effects, first rapidly and subsequently more and more slowly. The curvature after unloading is measured on an enlarged image of the test specimen by means of a metal mirror. For measuring, a simple projecting apparatus has been constructed.

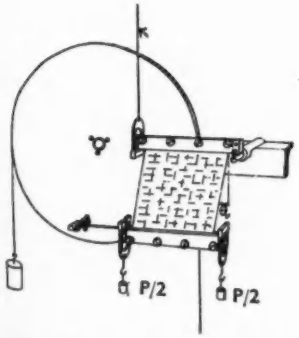


Fig. 4. Sketch of apparatus for measurement of shearing properties. K is the force registered by the strain-gauge of the Instron machine

Shear

An apparatus designed at the Swedish Institute for Textile Research and measuring not only the deformation but also the resistance to shearing has been previously described. A sketch of the instrument is given in Fig. 4. The device is adapted for mounting in an Instron tensile testing machine. In this way complete hysteresis curves are obtained.

Buckling

A property closely related to bending is buckling. One reason for studying this property is that buckling deformations are rather frequent in wearing apparel.

A photograph of the measuring device, adapted for use in an Instron tensile testing machine, is shown in Fig. 5. The test specimen is inserted between two clamps. The lower clamp is rigidly fixed to the movable Instron beam. The upper clamp is guided by means of two rods mounted in bearings on the frame of the Instron machine and suspended by a wire from the strain-gauge. An extra load is hanging on the left-hand end of the rods in order to maintain tension in the suspension wire throughout a test. This means that the buckling load is measured as a diminishing of the drawing force in the suspension wire.

Fig. 6 shows three typical load-deflection curves in the warp direction. The first curve is similar to that of isotropic materials. The second shows an extremely high critical load and thereafter a steep drop. The third, rather frequent type of curve, is a moderate case of the second type. Thus, in many cases, the fabric behaves differently from isotropic bars.

Conclusion

Complex deformations of fabrics have been studied, and in doing so we have tried to find which elementary properties can be used for describing complex deformation. The study has been started with fabrics manufactured from continuous-filament viscose rayon yarn as likely to have uniform properties. The results may then be true only for these fabrics, and it remains to be seen whether the conclusions drawn and the hypotheses will be useful also in other cases.

The study has been stimulating in another respect, for the new methods and instruments which we found necessary to introduce are now under test for controlling finishing processes. Thus it seems, e.g., possible that the shearing properties will prove to be significant for many properties of wool fabrics and that the finishing processes may be controlled from prescribed shearing values. If that turns out to be true, the door is opened for introducing closer tolerances for various mechanical properties in many textile manufacturing processes.

The Torque in Highly Twisted Nylon 6 Monofilaments

By J. J. MERTENS

THEORETICAL considerations have lead to the following formula for the torque M in highly twisted monofilaments with a circular cross-section:—

$$M = 2\pi d^3 \int_0^{\frac{1}{2}} \tau \left[\rho/d \right] . (\rho/d)^2 . \mathrm{d}\ (\rho/d),$$

where d = the filament diameter

ρ/d = the relative radial distance from the axis

$\tau[\rho/d]$ = the shear stress at ρ/d from the axis

With this formula it appears to be possible to compare the torques in highly twisted filaments which have been subjected to different treatments before twisting, in such a way that the influence of the resulting differences in diameter can be separated from the effects of the differences in molecular structure.

Fig. 1

The influence of the differences in diameter can be eliminated by changing over from the observed torque M to the "reduced torque" $M^1 (=M/d^3$, d = filament diameter), i.e. the torque which would exist in the filament under geometrically similar conditions if this filament had a diameter of unit length.

Experiments were made on nylon 6 monofilaments in order to investigate the effect of processes, such as drawing and heat-setting under various conditions of time, temperature and tention, on the "reduced torque" and its torsional relaxation.

Measuring Process and Measuring Apparatus

Torque and torsional relaxation were measured on pieces of filament 6·0 cm. long, inserting under constant longitudinal load a known number of turns and measuring almost immediately afterwards the torque of the twisted filament as a function of the time. For this purpose, the measuring apparatus shown in Fig. 1 was used; Fig. 2 gives its principle.

The filament is held in the clamps c and d and is twisted by allowing a spring to release a given number of turns. The torque in the filament is transferred via a light frame, to which clamp c is fixed, to the torsion wire a—b of a torsion balance. The torque in the filament causes the frame to turn a few degrees as indicated at W. The torque is found by twisting the torsion wire a—b until the pointer W returns to its original position. This is done by turning the knob K in the direction indicated, and the magnitude of the torsion of the torsion wire a—b can be read from the scale S. From this reading and from the known torsional properties of the torsion wire follows immediately the torque in the filament c—d.

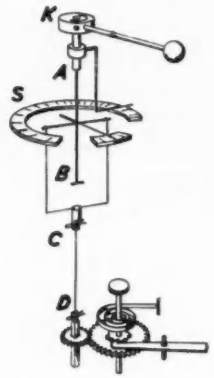


Fig. 2

The displacement of the frame of the torsion balance and thus of the clamp c during the measurement of the torque is very much smaller than the number of turns inserted into the filaments. The longitudinal load on the filaments during twisting and measuring was 0·06 ± 0·01 g./den. When at this constant load a high twist is inserted, the monofilaments decrease considerably in length. To accommodate this shortening, clamp d can slide vertically in the driving gear wheel.

Measurements and Discussion

The following items were dealt with:—

(1) Reduction of the measured torques to torques which apply to filaments with unit diameter (viz. the reduced torque).

(2) The influence of the drawing process on the reduced torque.

(3) The influence of the setting process on the reduced torque.

(4) The torsional relaxation.

The torques mentioned in items 1, 2 and 3 have been measured 1 min. after the filaments have been twisted to a certain value.

Medal Award

The Textile Institute Medal has been awarded to Mr. W. A. Dutton, F.T.I. (assistant director, Hosiery and Allied Trades' Research Association, Nottingham), and Mr. H. Marsden, M.C., M.Sc., F.T.I. (Universal Winding Co. Ltd., Manchester). The medal was inaugurated in 1921 as an award by which recognition could be given for distinguished service to the textile industry in general and to the Institute in particular.

TEXTILE MACHINERY and MILL EQUIPMENT NEWS

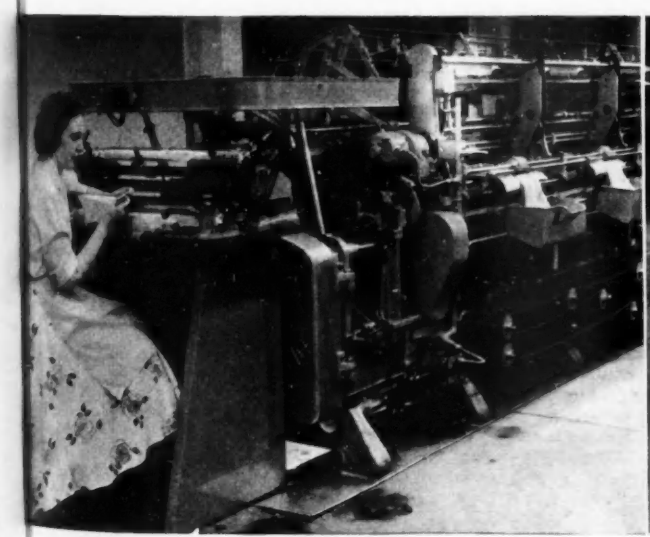
Automatic Knitting Machine for Fashioned Knitwear

Features include automatic bar feed, press off, resetting, bluffing and fabric take-off mechanism

WHAT is claimed to be the world's most advanced fashioned garment knitting machine has gone into operation for the first time at the Heanor, Nottingham, knitwear factory of I. and R. Morley Ltd. Called the "Samcomatic," the machine which brings automation to the manufacture of fashioned knitwear, has been evolved in collaboration between Morley technicians and S. A. Monk (Sutton-in-Ashfield) Ltd. Dispensing with something like a dozen manual operations, it can virtually be "left all day" once it has started running. Two "Samcomatic" machines have so far been installed by Morley. "Their introduction enables us to increase substantially our productivity and should eventually have a favourable effect on the prices of our fully-fashioned jumpers, cardigans and twin-sets," said Mr. A. E. Howitt of I. and R. Morley Ltd. "Although the new machines will produce far more garments for each skilled operative it is confidently anticipated that our increased sales will prevent any redundancy."

Outstanding new features of the "Samcomatic" are automatic bar feed, press off, resetting, bluffing and fabric take-off mechanisms. Manual operations, which it eliminates, are as follows: racking out carriers and fashioning ringers, to required starting position; engaging thread carrier; connecting loose weight to ribs for initial courses; putting the widenings into operation; disengaging weight hooks and connecting up work to work rollers; putting widenings out of operation; putting filling-up out of operation; putting narrowing into operation; placing rib transfer bars into position; taking out carrier connection and pressing-off finished garment; disconnecting hooks from fabric and deliver fabric to bins.

The drive for the machine consists of two electric motors, the main motor driving the machine at all times during the actual knitting of the fabric. At the end of the garment, just prior to the press-off course, the sequence drum changes over from the main motor to the sequence motor which drives the machine at a safe speed for the machine to complete its cycle and resetting.



New automatic knitting machine, now in production at the Heanor factory of I. and R. Morley Ltd.

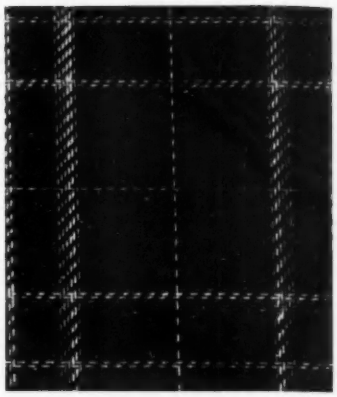
The first two "Samcomatic" automatic knitting machines in operation at the factory of I. and R. Morley Ltd.

Assessing Appearance of Proposed Fabrics

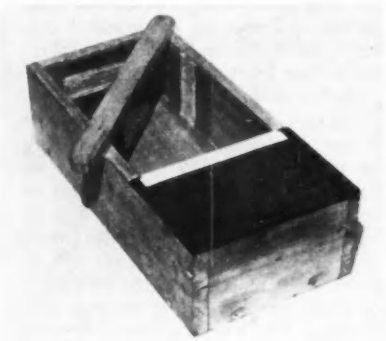
AN ingenious device for demonstrating optically what the appearance of a woven fabric would be if it were produced, has been invented by Mr. A. R. Margary, a wallpaper manufacturing engineer, of Leek (Staff.). With the device it is possible to see whether certain colours or kinds of filaments when combined in a fabric would be pleasing to the eye or not, thereby avoiding the necessity of producing a piece of fabric in a loom.

Although the device was first patented in 1956 it has not yet been developed beyond the prototype stage. Basically, it consists of a box with a peep-hole at one end, containing a mirror on which a weave pattern has been marked, and two cards or frames, on one of which threads intended for the warp are wound, and on the other, threads intended for the weft. The cards are mounted at pre-determined distances from the mirror, which is movable and can be set at an angle, one card being placed behind the mirror and one in front.

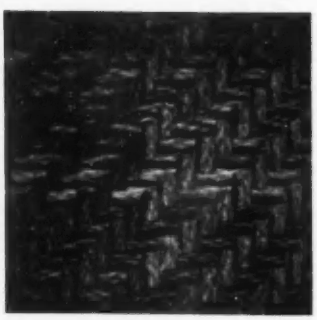
The mirror has reflecting surfaces spaced at intervals apart so as to reflect parts of the set of threads to an observer, whilst allowing, through the clear spaces between them, an observer simultaneously to see other parts of the threads, the composite image thus produced giving the effect of looking at a piece of fabric produced from a combination of the threads. The device can be adapted to produce a magnified or diminished image or picture which could be projected to a suitable screen or photographic plate.



The effect produced by a more ambitious model of the device, also with a 2×2 twill patterned mirror



A crude trial instrument made by Mr. Margary to demonstrate the appearance of a woven fabric when produced. The box contains a mirror with a 2×2 twill pattern scratched through it, a card of horizontal threads viewed through the clear glass produced by the scratching and a card with vertical threads on it viewed by reflection from the silvering left on the mirror

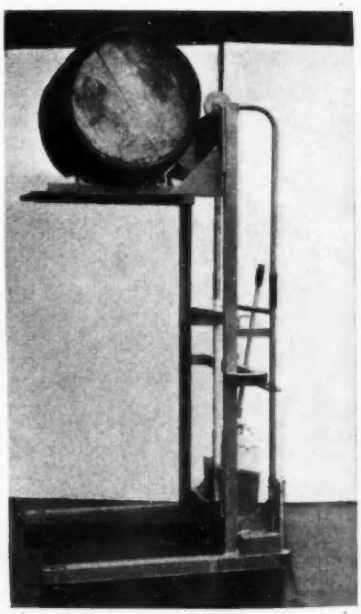


Showing the effect obtained looking through the peep-hole at the end of the box

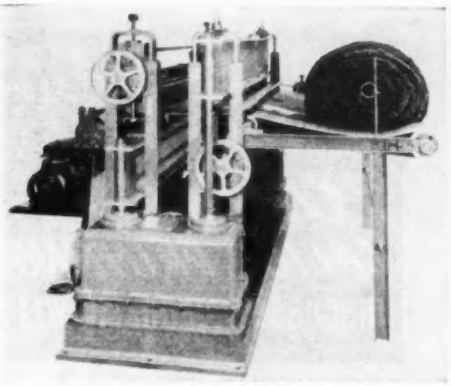
Lifting Truck Handles, Casks and Barrels

ORIGINALLY designed to meet the barrel handling requirements of a large textile manufacturing concern, a new version of the "JU" hand-operated Jacacaddy lifting truck is now in production and available from W. E. Langley and Co. (Mechanical Handling) Ltd., 14-16 Magdalen Street, London, S.E.1. Handling 5-cwt. barrels containing the chemicals used for man-made textiles is a problem and the purpose for which this new type "JU" truck was designed was the picking up of a full barrel of liquid, raising it to a height of approximately 4 ft., transporting it, emptying its contents into a tank and returning the empty barrel to a dispersal point.

Replacing the standard platform construction of the "JU" truck in this new version is a pair of ramp forks embodying four rollers on which the barrel rests secure. The gradient of the ramp is such that little effort is required to unload the barrel. Over the tank or vat the barrel is easily rotated on the rollers for locating the bung and for tap insertion and finally into position for pouring. A hand-operated variable speed pump is fitted to the unit so that light loads can be raised very quickly, or in the lower gears with loads of near maximum capacity, like the full barrel, the effort of pumping is minimised for a small reduction in the speed of lift.



New High Speed Needling Machine



A view of the new machine from the side

William Bywater Ltd., Leeds

IN an endeavour to provide an improved machine which will assist in mechanically bonding fibres for the manufacture of non-woven fabrics, William Bywater Ltd., Leeds, have recently developed a high speed double punch needling machine. With this machine the batt of fibres is needle punched from both sides, thus eliminating the need for the felt to be passed through the machine for a second time. The eccentric motion is of an entirely new design, and the punching speed has been increased to 750 punches/min., compared with speeds of 250-300 on older type machines. The makers state that it is hoped that the mechanical bonding will mean a possible reduction in the percentage of chemical bonding agents and give the non-woven fabrics a textile handle. Further uses for this type of machine are in the development of non-woven blankets and wearing apparel. The same principle of needling has now been accepted in the manufacture of certain types of industrial felts, notably felts for the asbestos cement and paper industries. Certain types of surgical bandaging and filter fabrics are also made by needle-punching only, without any supporting scrim. The double punch machine is designed to fit into a continuous production plant.

The new Bywater high speed, multi-roller hardener, for the manufacture of light weight pressed wool felts is also now in production. The first machine is installed at the Bury Felt Manufacturing Co., who are joint co-patentees, and a second machine of this type has been shipped to the U.S.A. The production capacity of this machine is claimed to be some 3-4 times greater than conventional roller hardening machines—and due to its being a continuous hardening machine it is more suited to light weight felts than a platen hardener.

Compact Stainless Steel Wash Wheel

A NEW wash wheel has been produced by the Calico Printers' Association Ltd. and deliveries are now being made. It is a more compact version of the S.D.C. wash wheel used in testing the fastness to washing of coloured materials. The main dimensions of the machines are 3 ft. 2 ins. long × 1 ft. 5 ins. wide × 3 ft. 10 ins. to top of cover. At the control panel end the thermostat and switches protrude a further 3 ins. The body of the machine together with the rotor, pots, cover and all other parts in contact with the water, are entirely constructed from stainless steel. The outer casing (which also acts as a guard for the drive and electrical connections) is made from mild steel sheet suitably treated to prevent rust, and finished in gloss enamel. The drive is by 1/3 h.p., 3 phase, 400-440 volts, 50 cycles geared motor, driving the rotor by means of V-belt and pulleys. The bearings of the rotor are self-lubricated by the water in the wash wheel. The motor is controlled by a thermal overload type starter, which gives full protection against single phasing or accidental overload.

The heating is by a specially designed 4½ kW tubular heater, working on 230-250 volts, and is controlled from an independent D.P. 20 amp. switch. An indicator light is incorporated to give visual warning when the heater is switched on. To ensure maximum heating efficiency the body of the wash wheel has insulation panels round it. The temperature is controlled by a vapour pressure type thermostat operating a mercury "on-off" break switch, the range may be set to any temperature between 95 and 220°F. The time for reaching 140°F. from cold is approximately 35 mins. when the thermostat comes into operation thereafter the heater is in circuit for approximately 20% of the running time. Water inlet for connection to rubber hose and ½ in. drain off valve are provided. The machine is normally fitted with eight or twelve pots as ordered, but it may in fact be supplied with any (even) number of pots up to a maximum of sixteen.

Mr. J. T. Kay of the Calico Printers' Assn. Ltd., demonstrates the new wash wheel manufactured by the company

1789
OBRIENS
'CALICO PRINTING'
DISCUSSES CROOKED WEFT

however be here faid, that the chief care is to keep the weft as much as poffible in the fame ftate as when woven, that is, in refpect to the direction of the threads ; the omiffion of which, even when work is folded to go for fale, is evident in many patterns. As for inftance, if a piece be calendered fo badly, that the threads lay all very obliquely acrofs the table, and the pattern be of a fquare fet kind, it muft be clear that if printed on in fuch a ftate, and in the courfe of the following proceffes the cloth gets into its original ftate, the work will appear juft in the fame oblique direction, as the fhoot of the cloth did when it lay on the table ; and inftead of the object being of a fquare kind, it will appear more like a diamond, which is almoft making a different pattern of it, and in the inftances of fmall fprigs or other fet objects, it muft greatly tend to throw them out of fhape and their proper diftances.

1958 The accepted answer to the problem

The Durrant
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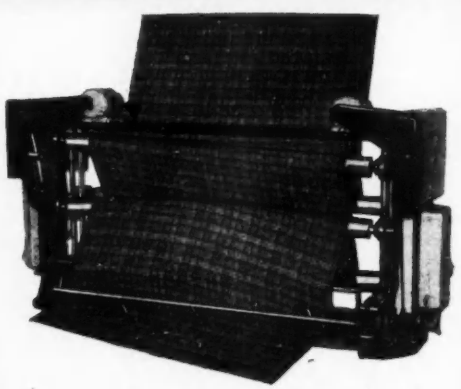

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THE TEXTILE
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Recent Developments in Textile Finishing, etc., Processes

A discussion of new treatments includes flameproofing and crease-resist processes on cotton and viscose, new dyes and dyeing techniques for "Terylene" and "Darlan," improved bleaching treatment for acrylic fibres, optical whitening agents, etc.

By B. C. M. DORSET

IT is well known that one problem with cotton and viscose rayon fabrics which have been made crease-resistant by treatment with a resin is that when such fabrics are afterwards laundered under conditions which include a chemicking to improve their whiteness there occurs a chlorine pickup so that when the fabrics are subsequently hot ironed they may lose much of their strength and in fact be quite ruined. The chlorine pickup may also be accompanied by a yellowing of the fabric and the acquiring of an easily detectable chlorine odour. The weakening of the fabric may occur even when the hot ironing does not take place for some weeks after the chemicking. These phenomena are now termed chlorine-retention and chlorine-retention damage and have recently begun to attract more careful investigation than hitherto.

Chlorine retention characterises resin-finished goods whenever the resin is of the aminoplast type as exemplified by urea- and melamine-formaldehyde resins and it is probable that the retained chlorine exists within the fabric in the form of a chloramide of the type shown in Fig. 1, i.e. the chlorine is attached to a nitrogen atom.

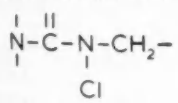


Fig. 1

It is believed that during the hot ironing and with moisture present this chlorine becomes converted to hydrochloric acid and as is well known hot acid in contact with a cellulose fibre can rapidly produce much damage even when the acid concentration is very small. The damage actually arising from chlorine retention in resin-finished goods is partly dependent on the amount of retained chlorine, the temperature of hot ironing, and the type of resin present. Also the type of resin determines whether or not the yellowing is pronounced—a melamine resin usually produces yellowing more than a urea resin.

In recent years attempts have been made, and some of them quite successfully, to avoid chlorine retention by the use of alternative resins which contain no basic nitrogen atoms and thus do not form chloramides. But nevertheless it is very convenient to use urea- and melamine-formaldehyde resins. Thus it does appear desirable to have more knowledge of chlorine retention and chlorine-retention damage so that it might be possible to use these resins without incurring the defects now under discussion. A recent publication by Nuessle (Amer. Dye. Rep., 1958, **47**, 465) records the results of some interesting investigations of this kind.

Nuessle first draws attention to the different effects of hot ironing viscose rayon fabrics finished with different resins and then similarly chemicked with a hypochlorite and then hot ironed at increasing temperatures. The results are given in Table 1.

An initial observation of the resin-finished and chemicked fabrics was that the melamine and especially the non-methylated melamine resin-finished fabrics were noticeably yellowed as compared with the urea resin-finished fabric. Yet in the hot ironing the urea resin-finished fabric suffered most damage. In this connection it may be noted from practical experience that least trouble arises from chlorine retention when the crease-resist or other special finish is obtained by use of a resin formed from a cyclic ethylene urea with the formula shown in Fig. 2:—

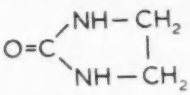


Fig. 2

In referring to this difference between say urea and cyclic ethylene urea Nuessle comments that it is

Table 1

Type of resin	% Chlorine retention	Tensile strength of resin-treated rayon fabric after hot ironing for 30 secs. at 200°F.	250°F.	300°F.	350°F.	400°F.
Urea-formaldehyde	1·47	50	49	13	2	2
Melamine-formaldehyde	1·27	49	50	—	42	11
Methylated melamine-formaldehyde	1·27	41	42	—	37	14
None	0·05	45	45	—	46	38

possibly due to the fact that in its reaction with formaldehyde the cyclic ethylene urea, more than urea itself, tends to react more completely so that the amide groups become more completely blocked and thus less able to combine with chlorine to form chloramides. Thus while urea in reaction with formaldehyde will result in the formation of two methylol ureas of the formulae given in Fig. 3 and of

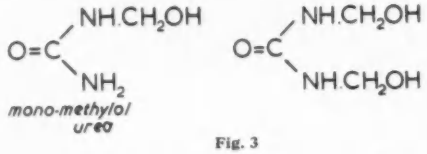


Fig. 3

which the mono-methylol urea will be liable to combine with chlorine the cyclic ethylene urea will tend to give only a dimethylol compound of formula shown in Fig. 4 and thus, because there are no amide groups, it will be less able to combine with chlorine.

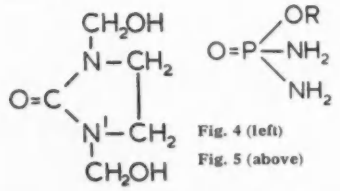


Fig. 4 (left)

Fig. 5 (above)

Another possible influence on chlorine retention damage during hot ironing is the buffering action of the basic resin itself. Whether or not the resin is formed from urea, melamine, or cyclic ethylene urea this will have the power to combine with any hydrochloric acid liberated and so protect the cellulose fibres from damage.

Flameproofing Cotton and Rayon Materials

A new flameproofing treatment which can be combined with a resin treatment to produce crease-resistance and/or dimensional stability and which leaves the textile material such that if ignited it does not afterglow (an effect which can be as harmful as actual burning) appears to owe its effectiveness to the use of an insoluble resin which can be formed from formaldehyde and an ester of phosphorodiamidic acid this latter substance having the general formula appearing in Fig. 5, in which *R* represents an alkyl or aryl radical which may contain substituents such as a halogen atom as for example chlorine. It is an intermediate condensation product of formaldehyde and the ester of phosphorodiamidic acid which is actually applied to the cellulose fibre fabric or other material, and these condensation products are esters of N : N-1-bis-hydroxymethyl-phosphorodiamidic acid having suitable water-solubility. The esters of the phosphorodiamidic acid may be prepared by reacting phosphoryl chloride within an alcohol or phenol and then treating the reaction product with ammonia.

The process itself consists (B.P. 799,606) of impregnating the textile material with an aqueous solution containing the intermediate condensation product and an acid or acid-yielding catalyst and then drying and heating to complete the condensation and form the insoluble resin. If crease resistance or dimensional stability is also required then there is applied in the same treating liquor an intermediate condensation product of an amino-aldehyde resin such as may be formed from urea, melamine, ethylene urea or a methylated melamine by reaction with formaldehyde. Such a process may be usefully described as it is applied to viscose rayon fabric to give flameproofing and crease-resistance.

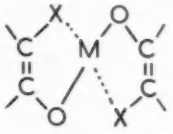
For the preparation of the treating liquor a mixture of 17 grams of phenyl phosphoro-diamidate, 18 c.c. of a 38% formaldehyde solution, and 1·25 grams of potassium carbonate, are heated in a water bath until solution is obtained; the resulting solution is then cooled and added to a solution of urea-formaldehyde condensate prepared by mixing 17 grams of urea, 34 c.c. of a 38% formaldehyde solution, and 3 c.c. of concentrated ammonia solution of sp. gr. 0·88, and then allowing the mixture so formed to stand for four hours without application of heat. After addition of 5 grams of ammonium dihydrogen phosphate (the acid catalyst) to the mixture this is diluted to 250 c.c. with water. The treating liquor so prepared is then padded into viscose rayon staple fabric to give a liquor pick-up of 100%. The fabric is dried in warm air, heated for three minutes at 145°C., soaped, rinsed and dried. The resulting fabric has a good full handle and crease resistance while being flameproof (it does not readily ignite even when held in a naked flame) and after any burning the residual char does not afterglow. This combined finish is highly resistant to laundering.

If crease-resist properties are not required then the following typical process may be applied to cotton fabric. Firstly, a mixture of 10 grams of ethyl phosphoro-diamidate and 10 grams of urea are dissolved in a mixture of 30 c.c. of formaldehyde solution and 2 c.c. of concentrated ammonia of sp. gr. 0·88 added when the mixture is allowed to stand for four hours without the application of heat. Then 2 grams of citric acid (the catalyst) are added and the mixture is diluted to 100 c.c. with water. Cotton fabric is then padded with this treating liquor, dried in warm air, heated for 8 mins. at 140°C., soaped, rinsed, and dried. The resulting cotton fabric has good flameproof properties and is resistant to afterglow and such a finish is fast to laundering.

New Dyes and Dyeing Process for "Terylene"

In B.P. 777,377 is described how "Terylene" materials may be dyed in many different shades from yellow through orange to violet and brown by the application of one or other of a large range of metallisable dyestuffs it being important to note that such shades can have excellent fastness to light and washing and to dry heat treatments. Another important feature of such a dyeing process is that it is not satisfactory to apply such dyes and then after-treat with a simple copper salt such as copper sulphate (this is effective in dyeing other textile fibres) so that the after-coppering must be carried out with a co-ordination compound of copper many types of which are now available. Thus it is satisfactory to use a complex copper derivative of an aliphatic diamine such as ethylene diamine or a complex copper derivative of aminoacetic acid or beta-aminopropionic acid but in general it is preferred to use as the co-ordination compound a chelate compound which is free from ionisable groups as for example the copper complex of N-nitroso-phenylhydroxylamine. Those chelate compounds of copper which are especially suitable contain in their molecular structure the group shown in Fig. 6 wherein *M*

Fig. 6



stands for copper (or other metal such as chromium or cobalt) while X stands for the groups shown in Fig. 7 and it is then not necessary for a carrier or fibre-swelling agent to be used in the after-coppering liquor. Suitable chelate compounds of this latter type include copper compounds of acetylacetone, benzoylacetone and of salicylaldoxime and of 2-acetophenoneoxime. Many

• High reactivity • Good light fastness maintained on urea-formaldehyde processed viscose rayon • Good fastness to severe washing

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Electro-Heat

The ways in which electricity can be used to advantage in industry are many and varied. Some are well known but others are not known well enough. For this reason the Electrical Development Association has prepared a series of detailed data sheets on various applications which will be printed in this journal from time to time.

This Data Sheet is the first of a number devoted to electro-heat—that is, heat produced by electricity for the processing and treatment of materials. Other uses will be dealt with later on in the series.

There is an unalterable physical law that the efficiency of conversion of *electrical* energy to *heat* energy is 100 per cent. The same cannot be said of the efficiency of combustion of any solid or liquid fuel.

All the applications of electro-heat have these advantages in common :—

1 Electro-heat is clean both in regard to its application and the method of generation.

2 It can easily be controlled more precisely than any other form of heat, manually or automatically.

3 It can be brought to the job instead of having the job brought to it.

4 It permits better use of floor space and the elimination of unnecessary handling.

5 In many of the newer processes it is the only possible form of heat which can be used.

6 It often ensures a higher quality of products with fewer rejects.

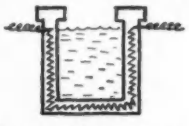
7 It gives the best working conditions.

8 It reduces or eliminates fire and explosion hazards.

Below will be found brief notes on some of the various methods of generating heat by electricity.

Resistance Heating

This is the best known form of electric heating. The elements provide a high resistance to the passage of electricity and thus heat is generated. It can be used in furnaces for melting or heat treatment of any material whether metal or not, or the resistance of the workpiece itself can cause the generation of heat.

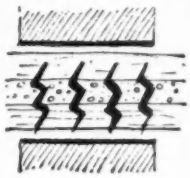


Induction Heating

Eddy currents are induced in the surface of a conducting workpiece, heating it up. The depth to which this heating will penetrate is determined by the time it is given.

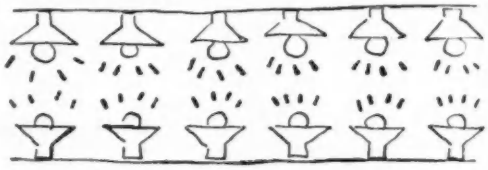
High-frequency Dielectric Heating

This form of electro-heat can be used only on non-conducting materials such as wood, plastic and rubber. The material is placed between two electrodes to which a high voltage is applied at a high frequency. This has the effect of generating heat inside the material rapidly and uniformly throughout its entire thickness.



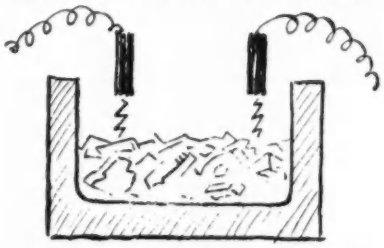
Infra-red Heating

This method employs pure radiant heat. The bulk of the radiation takes place in the infra-red portion of the radiation frequency spectrum. The heaters may take the form of reflector lamps or sheathed wire elements. The method is extremely flexible and has many uses, including paint drying and pre-heating plastics.



Arc Melting

This form of heating is chiefly used for melting steel. The diagram illustrates one method of operation.



Very large charges can be melted; melting units of 200 tons capacity are now in operation.

The Application of Electro-Heat

All these methods of electric heating can be applied in almost an infinite variety of ways. Some of these ways will be dealt with in subsequent sheets.

For further information, get in touch with your Electricity Board or write direct to the Electrical Development Association, 2 Savoy Hill, London, W.C.2.

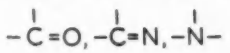
Excellent reference books on electricity and productivity (8/6 each or 9/- post free) are available—"Induction and Dielectric Heating" is an example; "Resistance Heating" is another.

E.D.A. also have available on free loan a series of films on the industrial use of electricity. Ask for a catalogue.

different types of metallisable dyestuffs are available.

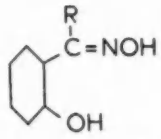
More recently it has been discovered (B.P. 799,742) that if the co-ordination compound of copper is formed from an oxime conforming to the general formula shown in Fig. 8 where *R* is

Fig. 7



hydrogen, alkyl, aryl, aralkyl or cycloalkyl, then the dyeing process can be much cheapened by using a mixture of say 1 part of the co-ordination compound and 2 parts of copper sulphate or cupric chloride in the after-coppering stage rather than the

Fig. 8



4 parts of the co-ordination compound necessary when this alone is employed. Further, the dyeings so produced have superior fastness to those obtained without the use of a simple copper salt but with the co-ordination compound alone.

The following is a typical dyeing process which uses the ruby red metallisable dye obtained by coupling diazotised 8-amino-quinoline with beta-naphthol. Firstly, the dye liquor is prepared with 12 parts of the above dye (previously dispersed by milling with 50 parts of water and 2 parts of sodium oleyl-para-anisidine sulphonate) and 80,000 parts of water containing 33 parts of oleyl sodium sulphate. Then, 2,000 parts of "Terylene" fabric are dyed in this liquor for one-half hour within an autoclave so that the dyeing temperature can be raised to 130°C. The fabric is then removed and again treated in the autoclave with a fresh after-coppering liquor prepared with 10 parts of the copper co-ordination compound of salicylaldoxime (previously dispersed as the dye) and 100 parts of copper sulphate in 80,000 parts of water—the treatment is for one-half hour at 125°C. Thereafter the fabric is withdrawn, and is soaped with sodium carbonate present at a temperature near to the boil. The resulting shade has excellent fastness to light and washing and is highly resistant to sublimation from the fibre in heat treatments. It is possible to obtain equally good results by carrying out the after-coppering with the copper co-ordination compound of 5-methyl-salicylaldoxime or 5-chloro-salicylaldoxime or 2-hydroxyacetophenoneoxime or one or other of several other similar oximes.

Among the metallisable dyes which can thus be employed for the colouring of "Terylene" and other polyester fibres are those obtained by coupling diazotised diethyl-aminoaniline with 8-hydroxyquinoline (red), diazotised ortho-anisidine with 1-phenyl-3-methyl-5-pyrazolone (yellow), diazotised 8-amino-quinoline with 5 : 6: 7 : 8-tetrahydro-2-naphthol (violet), diazotised 4-chloro-2-aminophenol with 6 : 8-dihydroxyquinoline (Bordeaux), and diazotised 4-chloro-2-aminophenol with 2 : 4-dihydroxybenzaldoxime (brown). It is obviously an advantage that satisfactory dyeings with this process can be secured without the use of a carrier since the use of such a compound can be expensive and lead to inferior fastness properties of the resulting dyeing.

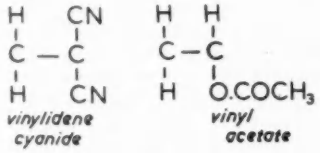


Fig. 9

Dyeing "Darlan"—The New Dinitrile Fibre

The announcement about two years ago that a new synthetic fibre was about to be introduced to the textile industry by the B. F. Goodrich Chemical Company in America has now materialised and Sommar of this same Company has recently published useful information (Amer. Dye. Rep., 1958, **47**, 553 *P*) concerning the dyeing properties of this fibre. It may first be recalled that this fibre is dry spun from a solution in dimethylformamide of a 50/50 copolymer of vinylidene cyanide and vinyl acetate having the formulae shown in Fig. 9, so that the chain molecules in the "Darlan" fibres are of the type given in Fig. 10, in which it is to be especially noted that the monomer molecules alternate regularly and not irregularly as might be expected from experience in the preparation of other copolymers somewhat similar to this one. Another significant feature about "Darlan" fibres is that they are completely amorphous and show no evidence of containing crystalline regions such as might be found in say "Terylene" and nylon.

From the dyeing viewpoint it is important to note that "Darlan" fibres have the low moisture regain of 2 - 3% so that they must be classed as being hydrophobic and of course this property largely influences their affinity for dyes. There are no severe temperature limitations imposed on the dyeing of "Darlan" since it has a softening temperature as high as 350°F. Further, the fibres suffer no appreciable shrinkage in boiling water nor even at 250°F. Its resistance to alkalis and acids enables it to withstand ordinary wet textile processing operations with the exception of kiering as carried out for the purification of cotton goods. It will withstand mercerising and bleaching treatments as used for cotton, and carbonising as employed for purifying wool.

The groups of dyes applicable to "Darlan" include the disperse, developed acetate, cationic, and some naphthol dyes; the disperse dyes have so far proved most useful. Careful comparison of the total amount of a disperse dye which "Darlan" fibres can absorb when sufficient time is allowed for full absorption to take place has shown that it is more absorbent of at least some of these dyes than other types of fibres and as shown by the data in Table 2:—

Table 2

Fibre		Saturation values (% dye in fibre) Disperse Orange 3	Disperse Violet 1
"Darlan" (dyed at 212°F.)		6·0	5·5
Acrylic fibres	do.	2·2	1·7
do.	do.	5·0	3·4
Polyester fibres	do.	4·8	4·7
Nylon	(dyed at 185°F.)	2·0	4·9
Acetate	do.	5·1	8·3

But against this large capacity for holding disperse dyes must be placed the fact that "Darlan" absorbs them very slowly so that if only commercial periods of dyeing, say up to two hours, are allowable then "Darlan's" dyeing

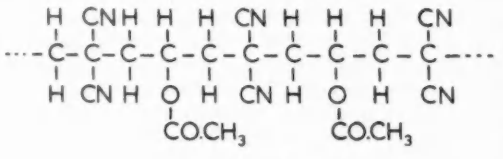


Fig. 10

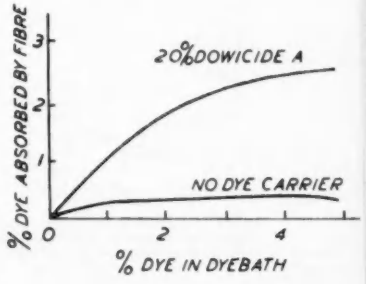


Fig. 11. Curves showing how dye absorption is influenced by the use of a dye carrier in the dyebath (Dowicide A)

properties are much less satisfactory. For instance, Sommar has found that nylon absorbs the above dyes one hundred times faster than "Darlan" and acetate fibres absorb them up to one thousand times faster. Thus by ordinary methods of dyeing "Darlan" with disperse dyes it is possible only to secure pale shades and even then the dyeing operation should be conducted as near to the boil as possible. The data in Table 3 give useful information

Table 3

	% Dye absorbed by "Darlan"			
	200°F.		210°F.	
	1 hr.	2 hrs.	1 hr.	2 hrs.
Disperse Orange 3	0·17	0·28	0·24	0·27
Disperse Red 15 ..	0·13	0·27	0·25	—
Disperse Blue 1 ..	0·15	0·25	0·23	0·24

in this connection about the effect of dyeing temperatures near to the boil.

It is evident that the small rise of dyeing temperature from 200 to 210°F. much increases the dye absorption but whereas an extension of the dyeing period from one to two hours at the lower temperature much increases the absorption of dye the same extension at the higher temperature of dyeing makes no significant difference in the dye absorption.

It must be accepted that if really deep shades are to be obtained with disperse dyes than recourse must be made to those conditions of dyeing where a dye carrier is employed and/or a dyeing temperature exceeding 100°C. is used. Among the dye carriers which have proved most effective are to be found Dowicide A (ortho-phenylphenol or a derivative of this), methyl salicylate, and Latyl Carrier A. Of these methyl salicylate is preferred for its effectiveness in increasing dye absorption, the brightness of the dyeings obtained, and its negligible harmful effect on their light fastness but it is liable to give spotty dyeings. Dowicide A is the least desirable since it gives duller shades and can reduce the lightfastness of the dyeings but it is the least expensive. Latyl Carrier A is a very desirable carrier in so far as it gives bright light-fast dyeings but it

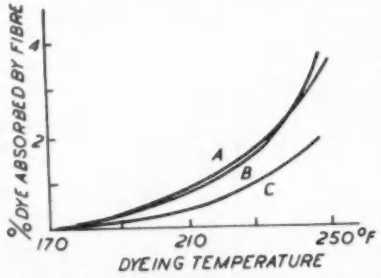


Fig. 12. Curves A (disperse orange 3), B (disperse red 3) and C (disperse blue 1) showing how dye absorption is influenced by dyeing temperature

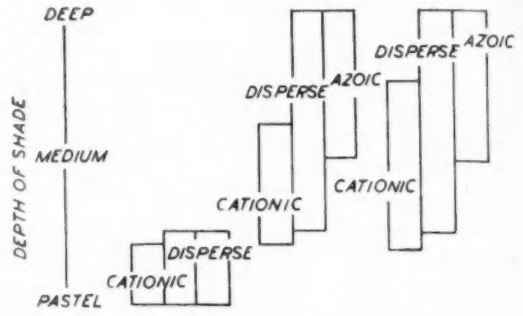


Fig. 13. Summary of dyeing methods for "Darlan"

is relatively of low effect and at the concentrations required is most expensive. A recent cheap dye carrier found to be effective is Santisizer 8, which is the N-ethyl derivative of a mixture of ortho- and para-toluene sulphonamides. However, Dowicide A has been most used for the dyeing of "Darlan."

The curves in Figs. 11 and 12 show how the dye absorption of a disperse dye by "Darlan" can be favourably influenced by the use of a dye carrier (Dowicide A) and of a high temperature. On the whole it is found cheaper and better to dye under high temperature-high pressure conditions than to use a dye carrier.

There are various problems associated with the application to "Darlan" of the azoic, cationic and disperse dyes which cannot be discussed fully here but the diagram in Fig. 13 will be found useful to the extent that it indicates how these three classes of dyes can be applied to secure pale, medium, and deep shades on this new type of synthetic fibre. No doubt further large scale experience will soon indicate improved methods of dyeing.

Improved Bleaching Treatment for Acrylic Fibres

One type of acrylic fibre such as "Acrilan" owes its good dyeing properties to its content of a small proportion of a basic N-heterocyclic component in addition to a small proportion of a vinyl component and a preponderance of acrylonitrile. A disadvantage of the basic component being present is that it increases the difficulty of producing a pure white fibre and promotes a progressive darkening of colour during exposure to light. It is thus desirable to have available some suitable bleaching treatment which will not only give a good white but, if possible, so modify the fibre that it is less sensitive to darkening in sunlight. Ordinary bleaching processes which are in common use for other fibres and which involve the use of such products as hypochlorite, chlorite, and hydrogen peroxide do not with these particular acrylic fibres give the results desired, but it has recently been found (B.P. 797,958) that a special method of bleaching with acidified sodium chlorite is much more effective and that it has the great advantage of producing a change in the fibre so that subsequent exposure to sunlight is made less harmful.

From trials using different conditions it would appear that the most satisfactory procedure consists of first treating the acrylic fibre material with a solution of sulphuric acid (preferably at a temperature approaching 100°C.) and then (thorough washing is not necessary) treating it for about one-half hour in a 2½ to 6% (calc. on the fibre) solution of sodium chlorite at 140 to 180°C. until no further bleaching occurs. It is permissible to use hydrochloric, phosphoric, and pyrophosphoric acids instead of sulphuric acid but the latter acid will be generally preferred. Generally it has been found that the concentration of the acid in the first treatment is important since on it depends the effectiveness of the subsequent treatment with sodium chlorite. This is indicated by some results given below and obtained using various acid concentrations and knitted material consisting of a type of acrylic fibre which is made by the wet spinning of a blend of a copolymer containing 94% of acrylonitrile and 6% of vinyl acetate with a second copolymer containing 50% of acrylonitrile and 50% of 2-methyl-5-vinylpyridine the blend being in such proportions that the fibres contain 6% of the 2-methyl-5-vinylpyridine.

Six samples of the knitted material were separately treated at 200°F. for 30 mins. with aqueous sulphuric acid solution of 0·025 to 0·4 concentration (liquor/fabric = 30/1), then immediately withdrawn from the acid liquors and immersed for 45 mins. in a 6% (calc. on the knitted fabric) solution of sodium chlorite at 150°F.

After thorough washing, the fabrics were then compared in respect of their brightness and purity of white and the results in Table 4 were obtained.

Table 4

Sample	Conc. of sulphuric acid	Brightness	Purity
Control (subjected to treatment only with the sodium chlorite)	0·0%	74·0	9·0
A	0·025	77·0	8·8
B	0·05	79·9	8·6
	0·10	83·2	5·2
C	0·20	83·8	4·7
E	0·40	83·0	4·2

The same bleached samples were then submitted to a light sensitivity test involving an exposure under glass for ten hours to sunlight and the changes in brightness and purity of white are set out in Table 5:—

Table 5

Sample	Brightness	Purity
Control	73·0	10·5
A	77·0	10·0
B	79·0	8·0
C	80·9	6·6
D	81·6	6·0
E	81·7	4·3

It is seen that in judging the most satisfactory white produced by the various treatments a balance has to be struck between brightness and purity of white and also to take into consideration the improvement produced as regards stability to sunlight. The conclusion actually reached is that the optimum conditions require the acid treatment to be carried out with a sulphuric acid concentration of 0·05 to 0·5% and the chlorite treatment with a chlorite concentration (calc. on the fibre) of 2½ to 6%.

Dyeing Polyvinyl Chloride Fibres

Polyvinyl chloride fibres have recently become available under the trade names of Rhovyl, Fibravyl, and Thermovyl and while they have several very useful properties including extremely good stability towards deteriorating influences they have proved difficult to dye. No doubt this difficulty is associated with their extreme hydrophobicity since they practically imbibe no water when wetted. According to B.P. 799,374 progress in solving this dyeing problem has been made by the discovery that if the dyebath contains suitable assistants a more rapid and complete absorption of the disperse dyes employed can be obtained. Apparently it is necessary to have present as assistants a liquid cyclic ketone, a halogenated aromatic hydrocarbon, and a dispersing agent.

Although cyclo-hexanone, methyl-cyclo-hexanone, and fenchone are liquid ketones which might come into consideration it is much preferred to use isophorone [1 : 1 ; 3-trimethyl-cyclo-hexene-(3)-one-(5)]. Ortho-dichlorobenzene, chloro-toluenes, and especially chlorobenzene are suitable halogenated aromatic hydrocarbons. Many dispersing agents are available and satisfactory and they may be anionic, cationic, or non-ionic but an especially recommended one consists of a mixture of equal parts of the reaction product of 8 moles of ethylene oxide with one mole of para-tertiary-octyl-phenol and of the reaction product of 40 moles of ethylene oxide with one mole of castor oil.

In a typical dyeing procedure of this kind Rhovyl fabric is entered into a dye liquor (liquor/fabric = 40/1) at 40°C. containing 1·2% (calc. on the fabric) of a blue amino-anthraquinone dye, say 1-methylamino-4-phenylamino-anthraquinone, and 5 grams per litre of a mixture of assistants as specified below. The temperature of the dye-bath is raised to 50°C. and then 55°C. (Rhovyl has a very low softening temperature) and the dyeing process is then carried on for 1½ hours at the latter temperature.

The dyeing assistant mixture which has fibre-swelling properties is prepared by mixing 50 parts of isophorone [1 : 1 : 3-trimethyl-cyclohexene-(3)-one-(5)] with 25 parts of chlorobenzene and 12·5 parts of the preferred dispersing agent described above. An alternative dyeing assistant mixture can be prepared by mixing 50 parts of methyl-cyclo-hexanine with 25 parts of chlorobenzene and 12·5 parts of the above described dispersing agent.

Optical Whitening Agents

Optical or fluorescent whitening agents are now widely used for giving to slightly off-white textile materials a much more brilliant white and they do this by fluorescing bluish to violet in the textile material when this is illuminated by ultra-violet light. Such agents are superior to the old blueing agents of the type of ultramarine blue and certain vat dye pigments because they contribute an increase of white without any introduction of grey.

The search for satisfactory optical whitening agents has largely resulted in the discovery of many based on 4:4¹-diaminostilbene-2:2¹- disulphonic acid derivatives and these are especially satisfactory because they have stability to hypochlorite liquors and have a sufficient substantive affinity for cellulose fibres, to ensure that the whitening is reasonably fast to washing.

Recently a new type of optical whitening agent, based on 4 : 4¹-diamino-stilbene-2 : 2¹- disulphonic acid but having certain selected combined triazine residues, has been discovered and this appears to have only a moderate or balanced substantivity to cellulose fibre goods so that there is no build-up in the material as described above. This new type of agent can thus be used by itself or it may be used in admixture with other types which are known to give an undesirable build-up so as to reduce the possibility of this occurring. The new agents conform to the general formula set out in Fig. 14 in which it is seen that a substituted triazine residue is joined to each amino group of the 4 : 4¹-diaminostilbene-2 : 2¹-disulphonic acid. In the above formula R^1 represents an amino group or a residue of a primary or secondary amine which is non-coloured while R^2 represents a chlorine atom or a hydroxyl group or has the same meaning as R′.

In typical agents of this type the meanings of R^1 and R^2 are given in Fig. 15. Such optical whitening agents are not only suitable for the direct treatment of off-white textile materials made of cotton, viscose rayon, etc., but they may be usefully incorporated in detergents and soaps in liquid or solid form.

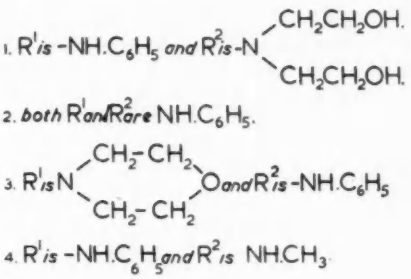

1. R¹ is -NH.C6H5 and R² is -N(CH2CH2OH)(CH2CH2OH)
2. both R¹ and R² are NH.C6H5.
3. R¹ is N(CH2-CH2)(CH2-CH2)O and R² is -NH.C6H5
4. R¹ is -NH.C6H5 and R² is NH.CH3

Fig. 15

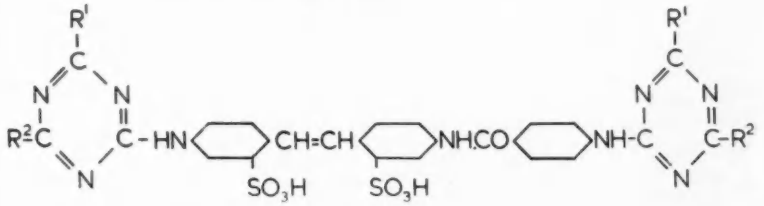


Fig. 14

Crease-Resisting Cotton

Modification of yarn and fabric offers great scope for there is ample evidence to show that fabrics not only differ in their response to the crease-resisting process, but also in the amount of apparent embrittlement they undergo ; it appears quite possible to aim at a figure not exceeding 15%, or even less

By J. T. MARSH, M.SC., F.R.I.C., F.T.I., F.S.D.C.

THE textile crease-resisting process imparts many great advantages to rayon and cotton fabrics and must be numbered amongst the most important treatments of the textile finishing industry. However, many of the features which are essential to success are still based on the somewhat empirical knowledge of the technologist in the works; not that there is anything wrong with empirical knowledge, for in its true sense, the word "empirical" means "without recourse to theory." Obviously there must be a considerable amount of observation and experiment before a sound theory can be propounded, but during the past few years a large number of papers have been published which help to clarify the process and enable it to be brought under still better control.

This state of affairs applies particularly to cotton, but in their enthusiasm and ingenuity some writers are apt to assume that crease-resisting cotton is rather a recent discovery, and do not appear to mention that cotton goods in the "anti-crease" finish were amongst the first to be marketed, both in Europe and in the U.S.A. However, it was soon found that there were many additional and favourable results with rayon in general, and spun-rayon in particular, so that the emphasis was placed on spun-rayon more from the standpoint of the merchant than of the finisher; indeed, rayon manufacturers owe a huge debt of gratitude to the crease-resisting finish. With rayon, the decrease in swelling and the great improvement in tensile strength, both wet and dry, were quite remarkable advantages, and important enough to merit the resin treatment in themselves. With cotton, however, the additional advantages were not so striking and certain undesirable effects were concomitant with the resistance to creasing; perhaps the chief of these is a deterioration in tensile strength and ripping strength.

It is important at the outset to appreciate that the apparent damage cannot be compared with that caused by acid or oxidising agents or other compounds which are harmful to cotton; this may be classed as chemical tendering. With the crease-resisting process, the slight fall in tensile and ripping strength does not continue to fall further after the process; indeed, by removing the resin it is possible to restore the original physical properties of the cotton goods. In many respects, this type of phenomenon was not unknown and could be demonstrated with many fillers, such as starch and china clay, as well as with some dyestuffs like mineral khaki; for this reason it is better to refer to it as embrittlement.

With cotton, the practical limit of the improvements which may be effected is largely determined by the extent of embrittlement and one of the most important problems of the finisher is to obtain the most favourable relation between recovery and embrittlement. This is all the more serious at present because of the requirements in connection with smooth-drying fabrics.

Before attempting to obtain a better relationship between recovery and embrittlement, it is obviously wise to examine the present relation in the light of available knowledge. Both cotton and rayon have their crease-resisting properties improved by the addition of resin but not in the same way; this is demonstrated in a simple and characteristic manner in Fig. 1. It will be seen that, to a first approximation, rayon can take up about twice as much resin as cotton before reaching the plateau where further

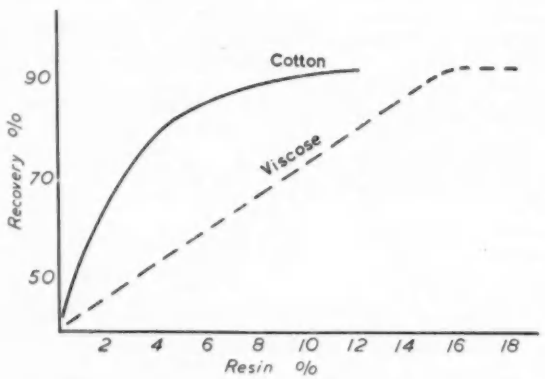


Fig. 1. Relation between the crease-recovery and added resin for cotton and viscose rayon

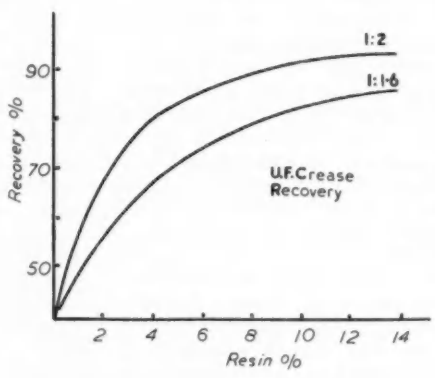


Fig. 2. Relation between crease-recovery of cotton and urea-formaldehyde resin in molecular ratios of 1 : 1·6 and 1 : 2

The Conquest of Friction

The ordinary (called in derision the 'penny-farthing') superseded the velocipede, and in turn was superseded about 1885 by the 'safety' bicycle. Cycling became a fashionable craze, its phenomenal success being largely due to the easy riding of the new cup-and-cone ball bearings just invented. If, in fact, the ball bearing made the safety bicycle popular, it is equally true to say that the bicycle inaugurated the ball-bearing industry, for it called for the first time for ball bearings to be made in large quantities by production methods. Today the products of the world-wide SKF organisation with its twenty modern manufacturing plants in different parts of the world are making possible the increasing popularity and absolute dependability of millions of modern bicycles.

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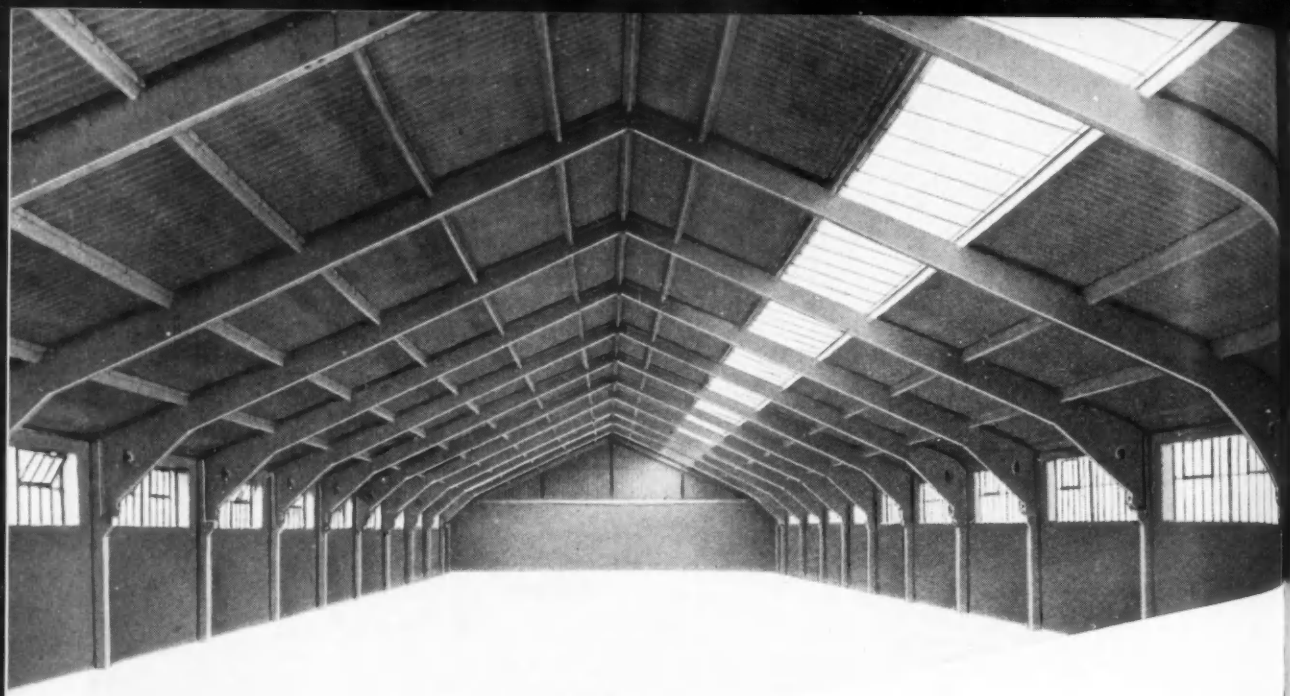

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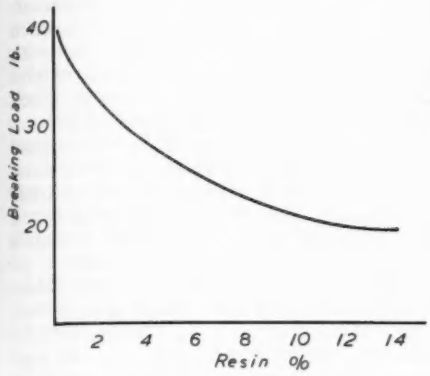

Fig. 3 (left). Relation between breaking load of cotton and added resin

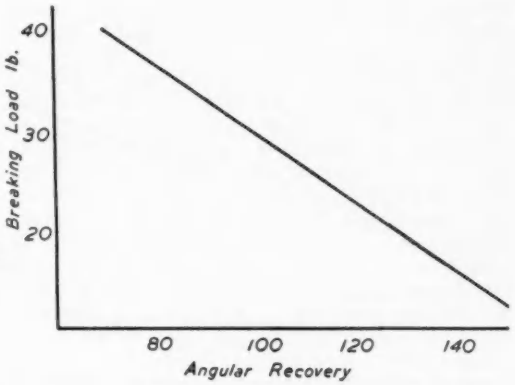

Fig. 4 (right). Relation between breaking load of cotton and crease recovery

improvement requires special techniques in both cases; this is in agreement with the water-imbibition and other properties of the two fibres, and associated with the relative amounts of amorphous and crystalline cellulose. There is, however, another important difference between the relationship of resin/recovery in the two fibres; with rayon the relation is linear but with cotton it is not so (as will appear later), it is logarithmic.

Fig. 2 relates to the recovery of cotton only but demonstrates that the same type of relation between recovery and resin still exists with urea-formaldehyde within the region of formaldehyde ratios generally encountered in trade products or in the finishing works. Fig. 3 demonstrates the relation between breaking load and resin; it will be seen that this graph is almost a mirror-image of that in Fig. 2, from which one may expect that there is a simple relation between recovery and embrittlement of cotton fabrics. Such a relationship was established for urea-formaldehyde in previously unpublished work of the writer and has been confirmed by others since and over a wider range of resins. For example, Fig. 4 was first published by Nickerson (Am. Dyes. Rep., 1950, **39,** 46) and relates to melamine-formaldehyde; it was later confirmed by Foster (Text. Bull., June, 1956).

Nuessle (Am. Dyes. Rep., 1952, **41**, 196) has provided a valuable review of the effect of various resinous condensation products on cotton fabrics, and although, as he states, much of the work confirms previous opinions, yet it is of importance as a broad study of resin types limited by recovery on the one hand, and ripping strength on the other hand. It dispelled some of the mystery and misunderstanding surrounding the treatment of cotton goods, particularly in the U.S.A. Having again demonstrated that thermoplastic resins do not give crease-recovery, attention was directed to urea-formaldehyde, melamine-formaldehyde, and a reactant which is not specifically identified but is very probably dimethylol cyclic ethylene urea.

For the efficiency of recovery on a basis of concentration, the cyclic ethylene urea is best, followed by melamine-formaldehyde and then urea-formaldehyde; in every case the recovery was accompanied by a fall in ripping strength on a common descending line relating recovery with ripping strength. Stronger acid catalysts gave a greater efficiency from the standpoint of the resin formed in the fibre, but there was no evidence that any great improvement in the recovery-rip relation of cotton is likely to be forthcoming either by the use of a particular catalyst or by the use of a particular concentration of a certain catalyst. The conditions of the final condensation, i.e. temperature and time, did not appear to be highly critical over the range studied (10 to 40 mins. at 140°C. and 5 to 20 mins. at 160°C.). It should not be assumed, however, that catalysts and curing conditions are of no consequence, for by drastic departure from the optimum it is possible to hydrolyse the resin and degrade the cellulose.

Post-mercerisation of the treated cottons at constant dimensions gave an increase in ripping strength at the expense of crease-recovery; the effect of shrinkage during post-mercerisation was not examined in any detail but it appeared that an improvement in the rip-recovery relation could result from this treatment. This aspect has been examined in greater detail by Reid and his colleagues (Am. Dyes. Rep., 1957, **46**, 719) with particular reference to methylol melamine when it was found that the ripping strength may be improved by 20% with only a slight diminution in recovery.

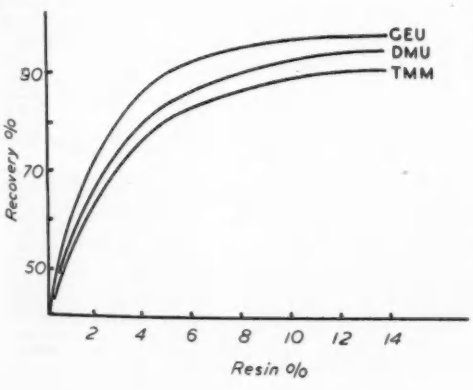

Fig. 5 (left). Relation between crease-recovery of cotton and the added resin with dimethylol cyclic ethylene urea, dimethylol urea, and trimethylol melamine

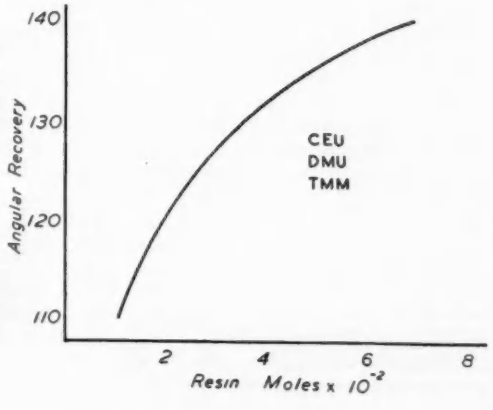

Fig. 6 (right). Relation between crease-recovery of cotton and added resin expressed in terms of molecular concentration

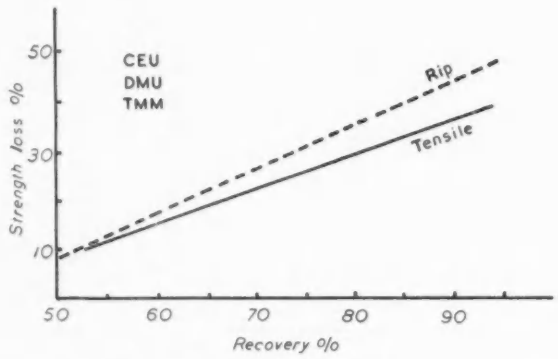

Fig. 7. Relation between losses in tensile and ripping strength of cotton and the crease-recovery with three different resins

Nuessle (*supra*) also found that the addition of stiffening agents to the treated fabric tended to reduce either or both he recovery and ripping strength, as might be expected; conversely, the use of softening agents can be beneficial but much depends on the nature of the softener and the type of fabric. It was also demonstrated that the type of construction in the fabric, including yarn as well as weave, plays a very important part indeed in determining the extent of ripping loss on resin treatment, and may be regarded as being of primary importance.

This type of investigation was extended in greater detail in an important paper by Smith (Text. Res. J., 1956, **26,** 836) from the results of which have been drawn the graphs of Figure 5 which show the effect of three resins in common use, namely cyclic ethylene urea, dimethylol urea and trimethylol melamine. It is quite clear that cyclic ethylene urea gives the best recovery on cotton and there is a general relation between resin and recovery. The reason for the difference in recovery from a given weight of resin is probably due to the difference in molecular weights of the initial condensation products and this was clearly established by Cooke and his colleagues (Text. Res. J., 1957, **27,** 150) who showed that the relation between recovery and molecular concentration of the three resins is essentially one curve, as demonstrated in Fig. 6.

Smith (*supra*) extended his detailed investigations further and subjected his results to statistical analysis from which he derived two regression equations for the relation between recovery and tensile strength, and between recovery and ripping strength. These are shown in the graphs of Fig. 7, from which it is evident that the drop in tear strength or tensile strength of crease-resistant cotton is directly proportional to the recovery, and independent of the type of pre-condensate. This is obviously a most important generalisation which must not be minimised; nevertheless, it is a generalisation and, as such, should not be applied to every conceivable combination of factors which are possible to imagine in the crease-resisting process. For example, Stam and his colleagues (Text. Res. J., 1956, **26,** 960) have pointed out that at the higher recoveries, which may be needed for smooth-drying cotton fabrics, cyclic ethylene urea departs from this relation between recovery and embrittlement, the tensile strength being worse than predicted; further, they claim that the temperature of curing has a greater effect with cyclic ethylene urea, for at the higher temperatures there is an undue fall in ripping strength without any benefit to recovery.

Cooke and others (Text. Res. J., 1957, **27,** 150) also draw attention to curing conditions and show, within limits, that the recovery from cyclic ethylene urea is unaffected; furthermore, the loss in tensile strength for the gain in recovery is greater with cyclic ethylene urea than with other compounds. Nevertheless, the generalised relation between recovery and embrittlement is something which should not be ignored; on the contrary, it should be carefully considered as an important factor in the rational treatment of cotton goods, and utilised to the greatest possible extent over the range of conditions where it holds good. It is most unlikely that in the finishing of cotton goods with resins, there will be one great universal formula which obtains in every conceivable circumstance.

Referring to Fig. 1, it was remarked that the relation between resin and recovery was not linear with cotton. Curves of the type shown may often be "normalised" by transferring the results into some other form with the hope of obtaining linear relations which are easier to compare than curvilinear. Foster (Text. Res. J., 1957, **27,** 129) has produced a series of simplified relations between the properties of the treated cotton and the resinous solid applied, when the latter is estimated as the logarithm. His results refer to cyclic ethylene urea and trimethylol melamine; some of them have been put together in Fig. 8. Up to a certain point, the recovery, tensile strength, and ripping strength are linear functions of the logarithm of the amount of resin in the fibre.

Influence of Cloth Construction

These simple relations are obviously of value in helping to predict the performance of crease-resisting cottons up to a point beyond which the addition of more resin does more harm than good except when special techniques are followed; many of these rather exceptional methods of treatment are practically impossible to utilise in works production and are outside the range of normal finishing. With different fabrics, the linearity of the relation still obtains but it is different, thus demonstrating the well-known point that the type of cloth construction can exert a great influence on crease-recovery and also on tensile and ripping strengths. It is probably here that there is the greatest scope for further research, particularly as the purely chemical approach with different resins appears to show a more or less constant relation between recovery and embrittlement.

Modification of the resin has been tried with different chemical compounds, and with compounds which behave

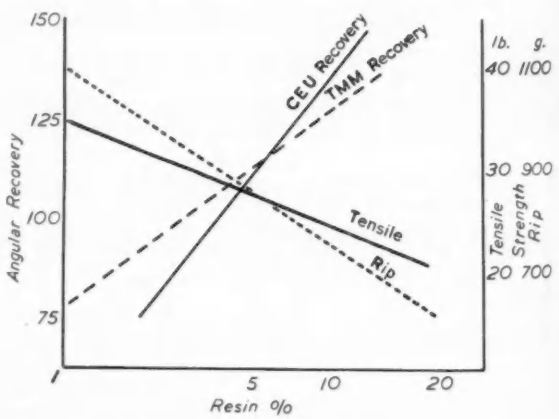

Fig. 8. Relation between the logarithm of added resin and the crease-recovery, tensile strength, and ripping strength of cotton treated with dimethylol cyclic ethylene urea and with trimethylol melamine

in various ways, e.g. the products which are polyfunctional and tend to react with themselves to form a resin, and the products which have a greater tendency to react with cellulose. Interesting and important relations have been found which help enormously in our understanding of the process and should lead to more efficient finishing, but it seems unlikely that this line of progress will lead to high tensile and ripping strengths in cotton goods of high recovery; indeed, there is some evidence to the contrary. The alternative method is to modify the fabric (including fibre and yarn) or the method of applying the resinous condensation product.

Modification of the fibre by mercerisation has been practised ever since the crease-resisting process has been applied to cotton goods, and there is ample evidence to show that pre-mercerisation can effect improvements in the tensile and ripping strengths of the treated material over the strength of treated unmercerised fabrics; there is little alteration in the recovery from creasing. Absorbency is improved and the cross-section becomes rounder. Nevertheless, a great deal of commercial mercerising is of indifferent quality and there is little doubt that substantial improvements in mercersing could be reflected in the properties of the anti-crease product. Suitable disposition of warp and weft tensions during mercerising could give a better balance of the final amount of embrittlement which is largely due to the reduction in extensibility of the fibre.

It is well known that the crease-resisting process gives an improvement in strength of rayon and a diminution in strength of cotton; this paradox has been attributed to differences in extensibilities of the fibres and also to differences in the ratio of amorphous to crystalline cellulose; mercerisation, at least in theory, affords a method of finding the happy medium. Softeners have been used with beneficial results in respect of ripping strength; it is probable that they act as lubricants enabling the fibres to slip on one another and then take up the ripping stress more or less together. However, an excess of softener may possibly result in a further decrease in breaking load by fibre slippage.

Modification of yarn and fabric offers great scope for there is ample, if uncollated, evidence to show that fabrics not only differ in their response to the crease-resisting process, but also in the amount of apparent embrittlement they undergo; it appears quite possible to aim at a figure not exceeding 15% or even less. Many manufacturers have a strong resistance to change, particularly in respect of "standard" fabrics on which their past reputation has been largely built, and whilst this is understandable, its universal application would constitute a major obstacle to textile progress; in this particular field of production, foreign competition is very strong. The alternative approach is to regard the crease-resisting fabric, and more particularly the smooth-drying cotton cloth, as an entirely new product requiring all the skill and technological knowledge available. There is much information available on the geometry of cloth structure, even if some of it is difficult to read, but little of it has received practical application. A careful investigation of the possible variables would undoubtedly show that certain minor changes in fabric construction would produce major changes in the physical properties of the smooth-drying fabric. This is more easily said than done, for the horizontal structure of the textile industry makes co-operation of the various sections a real problem, particularly when the final arbiter in the choice of fabric and finish is the merchant, or merchant-converter, who is often without technical or scientific knowledge.

It does not appear, at the moment, that great improvements in the physical properties of smooth-drying cotton goods are likely to come from blindly following the prescriptions of the various chemical manufacturers, however ingenious and enterprising they may be; there is no philosopher's stone in sight. More is to be gained from the combination of techniques, of technical skill and scientific knowledge, of long years of experience backed by a vigorous and successful research staff with its detailed knowledge of resins both old and new, under the guidance of some overall trade name denoting satisfaction, such as Tebilized, on which manufacturer, finisher and merchant, can all depend for present production and future progress.

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There are three types of Polyslip, each being available in two grades, A and B. A guide to their suitability for a given application is the P.V. factor. This is the product of the pressure in pounds per square inch of projected area and the relative velocity in feed per minute. The following P.V. values have been estimated to give a minimum life of 1,000 hours under completely dry conditions from results of running life tests on bearing test machines.

Polyslip 1	Grade B	1,200 P.V.
Polyslip 1	Grade A	1,700 P.V.
Polyslip 3 and 4	Grade B	3,000 P.V.
Polyslip 3 and 4	Grade A	3,500 P.V.

These P.V. values can be doubled in cases where hardened steel shafts are used. The presence of water or other liquid in which the bearing may be wholly or partly immersed also increases the allowable P.V. value. Certain substances used as additives to P.T.F.E. also have the ability to increase the permissible P.V. value for a given life to failure.

Because P.T.F.E. impregnated bearings are necessarily more expensive than oil retaining bearings, Polyslip bearings are not offered as replacements for oil retaining bearings. They are offered as specialised components to be used where conventional lubricants are undesirable or unable to withstand the operating conditions.

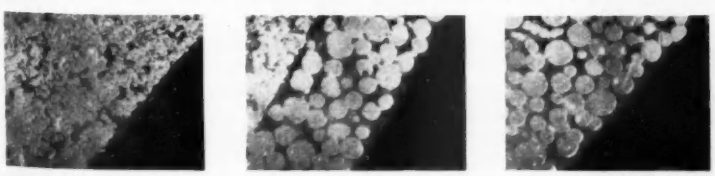
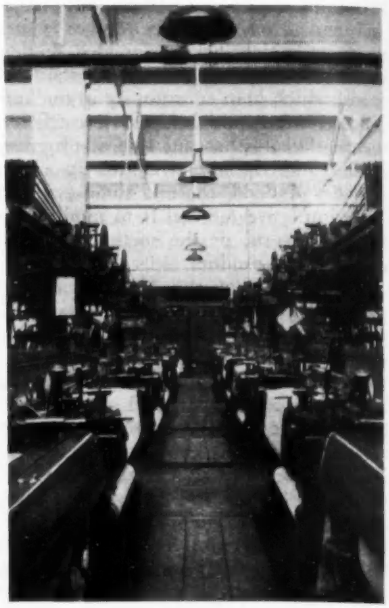


Photo-micrographs of Polyslip bearings, showing clearly the differentiation between the three types

Silk Velvets and Brocades

Brocades are figured fabrics, usually of elaborate designs and richly embroidered with glowing colours

By W. MIDDLEBROOK*



Livesey silk looms

VELVET, as distinct from *velveteen*, is purely a silk fabric, often ornamented with jacquard figures as a further enrichment of what is already a delightful fabric. *Lyons velvet*, as its name implies, is chiefly a continental product, a heavy silk velvet with a fast pile. *Ponson velvet* is another heavy silk pile velvet used for women's coats. For wraps and gowns there is *waterfall*, ribbed with velvet pile stripes $\frac{1}{8}$ in. wide; and *velvet nacré*, with the ground of one colour and the pile of a different colour, giving a changeable effect that gives rise to the name "velvet mother-of-pearl." *Velours* means "velvet," and *velours col* is a half velvet for coat collars, while *velours cannel*, or "channelled velvet," is a velvet with alternate stripes of cut and uncut pile. *Cannel cord* is a fancy velvet cord, and another cord style velvet with a fancy jacquard weave is *cordelet*. *Chiffon velvet* is of a lighter quality; *Croissé velvet* is used for trimmings, and *jasper velvet* has coloured stripes in the warp. A soft dress velvet given a polished surface by pile compression is *mirror velvet* and a *patent velvet* has a weft pile in a cord weave. *Peluche ombré*, which means "shaded plush," is made with shaded colours.

Brocades

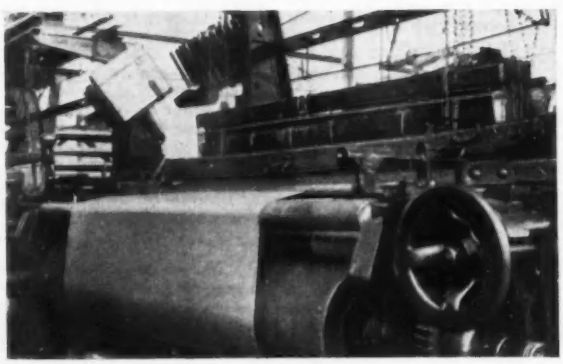
Brocades are figured fabrics, usually of elaborate designs and richly embroidered with glowing colours. As may well be imagined, fabrics of this type have been hand made in the Far East for centuries, and the original of *brocade* was called *baudekin* or *bodkin*, a rich silk fabric with a warp of gold tinsel, made in Babylon. Indian brocades were given poetical names that were well fitted to their beauty of design and colour, such names as *chand-tara*, "moon and stars"; *char khonana*, "squares of four-petalled flowers"; *keri-ne-chardani*, "mangoes and flowers with four petals," —a handloom fabric from Surat with flowers of gold on black silk; *khapedi ma phal*, "flowers in wavy lines,"—another Surat silk brocade; and *tara mandal*, "constellation of stars,"—a silk brocade from Kashmir. *Kharita* in India means "a letter," and *kharita bags*, used as envelopes by Indian princes, were made from beautifully woven and brocaded handloom fabrics of silk. A silk and gold handloom fabric from India is called *pitmanbar*, the name meaning "yellow cloth." Indian mythology describes the god Vishnu as "pitambar-dhari," meaning one who wears a yellow cloth.

The word *brocade* comes from the Spanish *brocado*, meaning "embroidered" and the latin *broccare*, to prick or figure. The French *broché* means "figured" and brocaded fabrics are usually figured by means of a jacquard; the term *broché* is also applied to all silk swivel figured fabrics, where extra weft figures are embroided on the cloth by small swivel shuttles. Other brocades are *brocatine*, *brocatelle*, a heavy cloth used as a tapestry; *blister brocade*, with a jacquard figure on a crepe ground that shrinks in the finishing process and crimps the design; *charmeuse georgette broche*, brocaded on a plain ground, and *frisé broché*, a fine silk brocade with large designs, 160×200, 70 den. grège warp and schappe weft. The word *frisé* means "curled."

Acca silk is a cloth of gold, using coloured silk weft that brocades the fabric with animal figures; introduced from Syria, it was first made in England in the 14th century, when it was used for church vestments. Another costly fabric of silk and gold is *brandeum*. *Taffeta fleuré*, or flowered taffeta, is brocaded with floral patterns; another taffeta with jacquard or fancy-weave effects is *taffeta faconné*. *Moiré antique*, used for dress silks and waistcoats, has figured stripes on a satin ground, and *ecaille* is a dress fabric ornamented with small diamond shapes, having a fine two-fold warp and singles weft; the name *ecaille* means "tortoise-shell or scales."

Croissé lisère, which means "cross border," is embroidered with small flowers on a 1×2 twill ground. *Lamé cloth* is brocaded on a satin ground, with a tinsel warp and tram silk weft, used for dance frocks, brocaded shoes and

* *Brocklehurst-Whiston Amalgamated Ltd.*



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furnishings; *lamé* means "worked with gold or silver." *Lampas* is another satin damask brocade, with warp and weft of different colours, made up into shawls that may be worn on the head, used as a flag or, in the last resort, as a shroud. It is also used for dresses and upholstery, and it is suggested that the term *lampas* may spring from the Greek *lampros*, meaning "bright and shiny," or from the Flemish *lamper*, a veil. *Lampas du Japan* is a brocade with a repp ground and warp satin figures, used for hangings and draperies.

Peau de gant means "glove or gauntlet skin," but it is really a strong and thick brocaded dress fabric on a twill ground. In strong contrast is the figured gauze fabric called *a jour*, a French term for open-work; another light fabric is *empress gauge*, with a satin weave of flowered figures, and *marquisette* may be brocaded on its gauze-like foundation of 2/100s voile yarns and every second dent empty. *Tie silks* are usually woven with a solid-colour warp, often black, figured or ornamented with coloured silk weft, either in dobby weaves or jacquard patterns, the finished fabric being cut "on the cross." *Silk dressing gown* fabric is also very often a brocaded cloth on a solid black or coloured ground.

Treatment to Improve Heat Resistance of Nylon

SUBSTANTIAL improvements in the life of nylon fabrics used at high temperatures can be obtained by the introduction of special finishes. New treatments have been developed primarily to meet the needs of the laundry industry and trials with nylon press cloths have shown that their life can be increased by up to three times. It is expected that various applications for the treatments will also be found in other industries. British Nylon Spinners Ltd., Pontypool, have evaluated three such treatments which can now be made available to the trade.

Early work showed that certain phenolic compounds gave a very marked improvement in heat resistance under laboratory conditions. Wash fastness, however, was unsatisfactory and efforts were made to increase this. Eventually three processes, all of approximately equal value, were evaluated.

Details of Treatments

Details of the three treatments are:

(1) A stock solution is made up as follows: For 10 gallons final impregnating liquor use 6.5 ozs. of commercial 40% formaldehyde solution and 6.5 ozs. of tannic acid. These are mixed and boiled together for 3-5 mins. This has the effect of forming a low molecular weight formaldehyde tannic acid condensation product. This condensation product is then added with stirring to the 10 gallons of water. For liquors above 10 gallons the weights of formaldehyde and tannic acid are adjusted accordingly. The fabric is then impregnated on the jigger at the boil for 3-5 ends, dried, and subsequently dry heat set.

(2) This is identical to treatment 1 except that the pre-condensate per 10 gallons final liquor is made from 6.5 ozs. 40% formaldehyde solution, 6.5 ozs. tannic acid and 4 ozs. pyrogallol.

(3) A ½% solution of tannic acid containing 4% formic acid on weight of fabric is prepared. The fabric is impregnated with this solution on the jigger for 30 mins. The bath is then dropped and the fabric re-impregnated in ½% tartar emetic solution for 15 mins. at the boil followed by subsequent dry heat setting.

Results of Laboratory Trials

Laboratory trials gave extremely encouraging results. Tests on 30 den. warp knit fabric, chosen to cut down the testing time, showed that after being exposed to a temperature of 216°C. for 5 mins. the bursting strength of treated fabric was virtually unaffected and averaged 36.0 lbs./sq. in. compared with 36.5 lbs./sq. in. for the untreated and unexposed control. When the fabric was washed five times at 45°C. (30 mins. each wash) and subsequently heated, the average bursting strength was 34.5 lbs./sq. in. When it was subsequently washed once for 30 mins. at 85°C., and then heated, the bursting strength averaged 34.0 lbs./sq. in.

In other series of tests, press cloth fabric was commercially laundered 10 times and exposed to hot air at 216°C. for 5 hours. While the bursting strength of untreated nylon dropped from 25 lbs./sq. in. to 1.7 lbs./sq. in., the heat treated fabric maintained a figure of 13.5 lbs./sq. in. Even more stringent tests showed that while untreated 150 den. fabric was destroyed after 30 mins. at 216°C., the treated fabric showed no weakening after 4 hours.

Results of Practical Trials

Practical trials with heat-treated nylon press cloths by commercial laundries confirmed the effectiveness of the finish, and increases in life of up to three times were obtained. The following table shows the working life of heat-treated nylon, compared with untreated nylon and cotton on various types of press.

	Cotton	Untreated nylon	Heat-treated nylon
Tullis press in a Watford laundry	72 hrs.	—	301 hrs.
Power circle press in a Newcastle laundry	60 hrs.	195 hrs.	316 hrs.
Simpson press in a Croydon laundry	121 hrs.	167 hrs.	375 hrs.
Imperial press in a Cardiff laundry	101 hrs.	99 hrs.	361 hrs.

The new treatments are expected to be used extensively for cloths for free steam presswork, for which nylon superiority is already widely recognised and for cloths for polished head presses, for nylon calender sheeting, and nylon canton flannel.

Although the treatment turns the fabric a brown shade, this is not considered a disadvantage. Any initial prejudice is expected to be dispelled rapidly when laundries appreciate the considerable economy which can be made as a result of the greatly improved performance.

In order to obtain the maximum life from the treated fabric, it is recommended that when these are washed a non ionic detergent or a solvent scour of approximately neutral pH be used rather than highly alkaline soap or synthetic detergent mixtures.

* * *

New President of I.C.F.

The new president of the International Federation of Cotton and Allied Textile Industries, Dr. W. T. Kroese (Netherlands), has assumed office for a term of two years. Dr. Kroese, managing director of the Royal Textile Mills Nijverdal-Ten Cate (Koninklijke Textielfabrieken Nijverdal-Ten Cate N.V.) in Almelo, is a past-president of the Association of the Netherlands' Cotton-, Rayon- and Linen Industry (Vereniging Katoen-, Rayon- en Linnenindustrie). He has represented the Netherlands on the Committee of Management of the International Cotton Federation since 1951 and is also a past chairman of the Federation's Committee for European Affairs. The new vice-presidents of the federation are Dr. Kurt Dieterich (Federal Republic of Germany) and Alfredo Sedó (Spain); Alfred B. Lohner (Austria) becomes honorary treasurer.

* * *

New Washable Wool-Dynel

Development of an entirely new group of "washable woollens"—wool-Dynel blend woven apparel fabrics is announced by Union Carbide Corporation, New York. Said to be truly washable—with less than 2% shrinkage in hot water laundering—the new fabrics are stabilised by the permanent heat-setting of Dynel. No chemical treatment is involved and the fabrics are claimed to have high strength, durability, and press-retentive characteristics, as well as washability. The washable blends are composed of 30% Dynel acrylic fibre and 70% wool in low-twist blended yarns for both warp and weft. After weaving, the pieces are subjected to high-temperature heat-setting with the fabric generously overfed. This process is used not only to finish the fabric but to heat-set and stabilise the material against further shrinkage.

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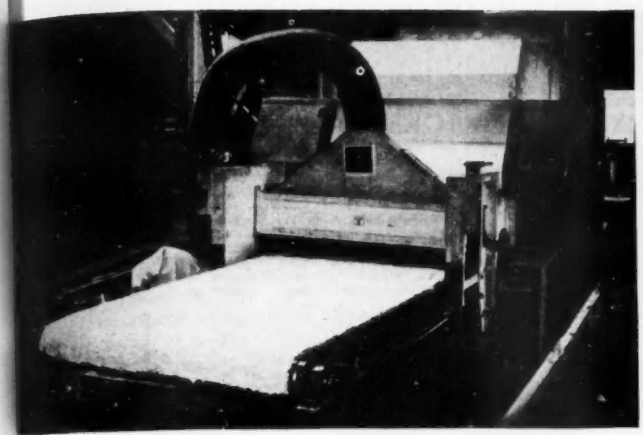
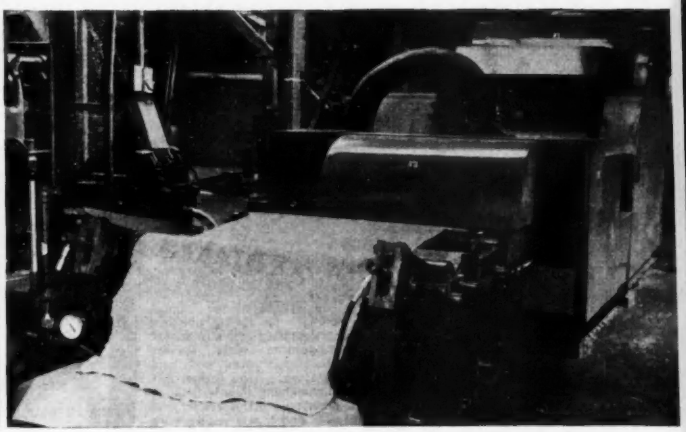


The new 3-unit assembly fibre amalgamating machine. Showing an unbranded asbestos web leaving the machine on the conveyor



The same machine with impregnator attached and an impregnated asbestos web leaving the machine for the drying process

Fibre Amalgamating Machines

By A. E. CALLAGHAN, M.I.B.E.*

MANY will be familiar with the closed circuit machine we introduced a few years ago. On examining the entries in our visitors' book for the past twelve months it was noted that they were representative of a very wide cross-section of the textile industries of the U.K. and overseas countries, and, in fact, about 50% of the entries were foreign visitors engaged in the industry. Their main interests were:—

(1) How would they be affected individually by the introduction of non-woven cloths industrially and otherwise in the future?
(2) Would it be possible to utilise their own waste materials now?
(3) Was the non-woven process likely to be economical?
(4) Would it require highly skilled technicians?

There was a keen additional interest on the part of the industrial chemical experts who had conducted considerable amounts of research and development work in their own laboratories and who now wished to steer their researches towards more practical ends.

One of the most enlightening features in the present state of development was to be found in the diversity of the fibres submitted to us for experiment from many parts of the British Isles and from abroad. Indeed, we have received practically every possible kind of animal, vegetable, mineral or man-made fibre in some form or another and all of which could be roughly classified into two distinct categories of coarse and fine fibres. We have been able to deal with a cross-section of the numerous varieties some of which were, of course, much more difficult than others. Research was essential. Research to find a compromise in the machinery which would enable it to deal with a very wide range of fibres without too many technical changes to the existing equipment. Consequently many different theories were followed and different approaches pursued many of which were ultimately useful and finally enabled us to produce the results we had set as our goal.

The major objective at all times was to augment the opening side of the equipment, always bearing in mind the problem of fibre breakage, and then having opened the fibres thoroughly to transport them to their destination and prevent any tendency for the fibres to felt in flight. This necessitated strict control of air currents in order to ensure that the air velocity carrying the fibres was accurately distributed across the full working width of the production machine and that a constant evenly distributed supply of air would be maintained throughout the working period of the machine. One of our major research problems, in bringing our closed circuit policy to a satisfactory conclusion, was to ensure that the amount of air blown in was counterbalanced by the amount of air sucked out. It was approached from many different angles and was finally solved by the application of a vacuum chamber to the condenser end of the unit to produce a levelling out position for the closed circuit system.

So we can say that we have now perfected a piece of equipment which has a very wide range of uses. It can deal adequately and effectively with long or short and light or heavy fibres and also produce webs which are randomised uniformly throughout their distribution. It is obviously quite easy to make a heavy web, but, it is not a particularly easy job to make a light weight one and this is where the controlled air circuit becomes an absolute necessity and comes into its own. Moreover, heavy fibres have different characteristics to light ones and we found that, if both kinds could be brought to rest at their point of impact, many of the major problems vanished.

An interesting sidelight on developments is the way in which the various companies decided to apply this new system to numerous and diverse uses. To instance only a few, there are many useful non-woven applications in the mattress, quilting and medical supplies trades as well as their uses for car linings, shoe linings, interlinings, felts, etc., and many of these applications require lightweight fabrics indeed. There are methods of producing such items that have been in existence for many years past and much has been written about them. It could, therefore, be argued that many

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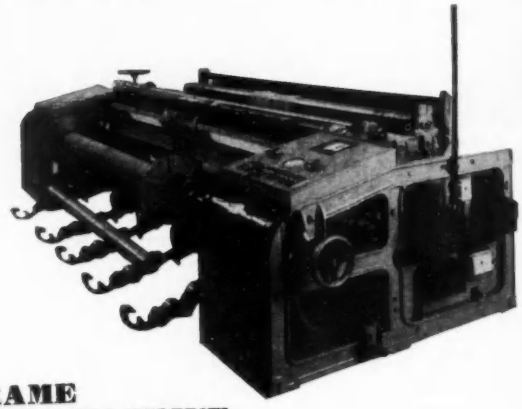

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interested undertakings will survey their existing equipments, such as cards, drying ovens, etc., and will come to the conclusion that they only need to install a layering machine and an impregnation unit to have a complete non-woven plant. Carding and drying equipment is indeed available, but there exists a very steadily growing demand for the kind of specially designed machinery which will be able to cope completely with these very specialised needs.

Waste materials would appear to occupy a predominant place and interest in the minds of the majority of people who have visited our works, and they all have the general idea of mixing virgin fibres with them. Carpet waste and allied fibres occupy perhaps an outstanding position of interest together with gauging the ultimate cost of production of useful non-woven fabrics from waste materials.

Impregnation of Materials

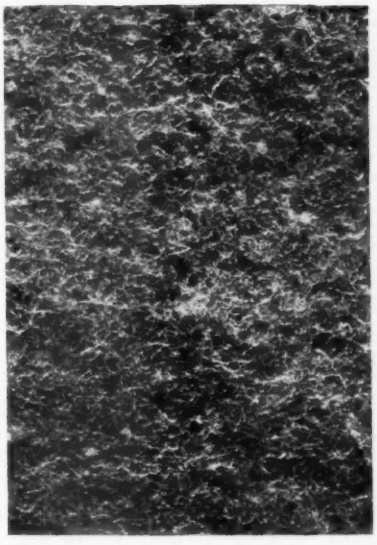
The use of liquid impregnates has been well known to the trade for years, starches, etc., having been applied to produce various forms of finished fabrics in the past. In employing resins and rubber solutions, however, it became necessary to study and understand the attributes of the bonding agents themselves and their effects on the materials to be bonded. Furthermore, a great deal of research was required in order to produce reasonably sized drying ovens able to cope with the drying and vulcanising problems connected with the manufacture of bonded materials. Increases in speeds of production necessitated technical research in the rubber solutions field with the objects of (*a*) raising the drying-off factors, (*b*) avoiding laminations in the finished fabrics and (*c*) enabling economies in the use of the solutions for spraying the fabrics. The problem of the maintenance of the spraying jets in those early days was a little disturbing and so that method was replaced by the bath impregnation system, introduced by Rubber Technical Developments Limited, the Research Department of the British Rubber Development Board, which has demonstrated its worth by giving very satisfactory results, although the question of process appears to remain a somewhat open one.

The U.S.A. has produced equipment on a very adequate scale to cope with the manufacture of non-woven fabrics and there is very obviously a wide market for these kinds of goods. It is extraordinary how many people are interested in the fibre amalgamating process and how little is really known today with regard to its ramifications. It is also amazing how extremely difficult it is actually to see a non-woven fabric plant in full operation. To help overcome these difficulties we are setting up a complete plant in our showrooms. We intend to install a prominent piece of modern equipment in this building to enable the widest possible variety of tests to be carried out and to demonstrate the plant in operation.

Material Tested and Fabrics and Webs Produced

Asbestos.—This fibre presented an interesting problem in that in forming a web or pad the natural tendency of the fibres when brought to rest was to produce a surface through which the air in the system would not penetrate. However, by allowing the fibres to recirculate (i.e., that at all times a given amount of fibres is passing through the recirculating system) and thus enabling the web to accumulate a high dust content, the problem was solved and the whole of the fibres and dust could be adequately controlled and utilised in the end product.

Carpet Shearings.—Here again there were interesting developments. We found it possible to make a felt of adequate proportions and reasonable web appearance and to utilise 98% of the total amount of fibres fed into the equipment. Introducing a minute quantity of virgin fibres enabled most attractive and interesting results to be obtained.



Close up of a randomised web of carpet shearings produced on the fibre amalgamating machine

Jute and Flax Waste.—There was widespread interest in both these fibres and we did a lot of research with them. Very spidery webs were easily obtained from the raw materials which were also simple to control in depth and density. In addition, they possessed a natural cohesion which imparted interesting strengths to the webs formed.

Cotton.—A certain amount of research was necessary with regard to these fibres to ascertain the natural nepping and very promising results were achieved.

Viscose Rayons.—These fibres were easy to deal with provided adequate and efficient pre-opening had gone into their preparation.

Sisal.—It was possible to produce very good samples of fine and heavy sections of fibres accurately and continuously without any alterations to standard equipment.

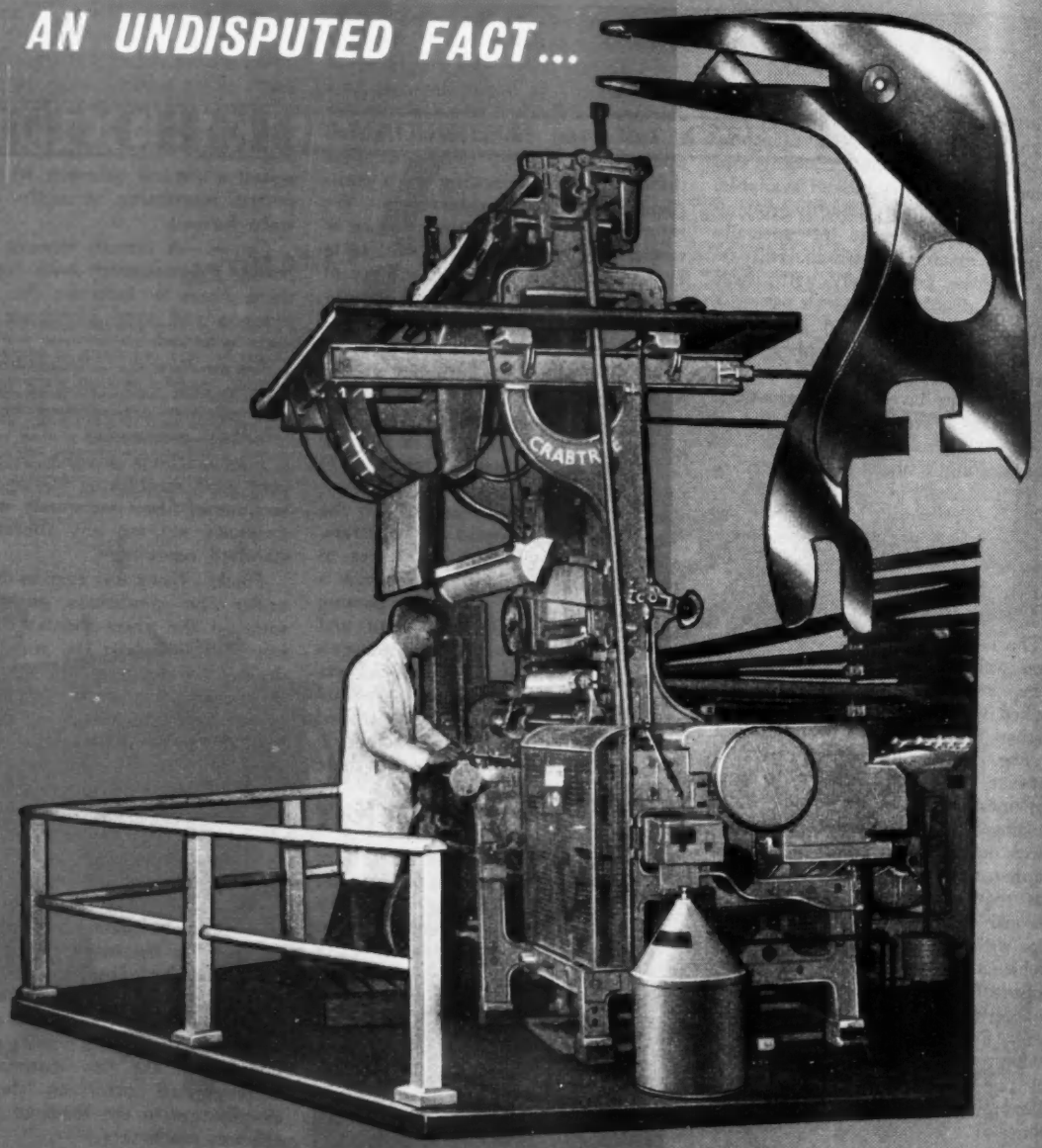
Flock.—Flock was easy to deal with under the conditions outlined for some of the fibres mentioned. It is important to bear in mind, when dealing with most of the fibres mentioned that it is reasonable to expect separate identities from any kind of process, and that some fibres have a natural tendency to absorb moisture whilst others tend to resist the application of liquids.

Certainly very much needed attention has got to be given to the provision of suitable forms of hopper feeds to meet the varied demands of the very wide range of materials which would be used for the manufacture of non-woven fabrics. In particular thought and attention must be given to the designing and construction of a hopper capable of permitting a more adequate opening of the raw materials to be accomplished prior to their final distribution to the feeds of the subsequent machinery.

For the past few years we have been well aware of the work that has still to be done in this direction, having had to tackle many of the problems ourselves. The major difficulties seem to arise when dealing with long fibres and particularly in securing adequate separation of the fibres to provide a reasonable even distribution at the drop point.

It is reasonable to suppose that the utilisation of a weight motion would bring its own problems in its train where very high speed drops were involved, and that therefore much better results would be obtainable if a continuous semi-lapping device were to be employed and thus we hope that we have now solved this particular problem.

IT'S AN UNDISPUTED FACT...



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Book Reviews

ILLUSTRIERTE TECHNISCHE WORTERBUCHER. VOL. 15. SPINNEREI U. GESPINSTE (Illustrated Technical Dictionary: Spinning and Yarns. Alfred F. Schlomann. R. Oldenbourg Verlag G.m.b.H., Rosenheimer Strasse 145, Munchen, Germany (price DM.80).

Making a very welcome re-appearance after being out of print so many years this new edition is a worthy companion to the volume that appeared in 1957 concerned with weaving, winding, warping, etc., and cloth terms. Textile manufacture is now almost a universal industry but the language problems raise some fearful obstacles for those engaged in international trade and technical development. It is probably true to say that technical German is one that presents far too many pitfalls and misunderstandings even amongst those well acquainted with their subjects. This question of understanding assumes far greater importance now in view of the proposed Free Trade Area and as many as possible of the language hazards should be removed. This remarkable work in six languages—English, German, French, Spanish, Italian and Russian—could not therefore, be more timely. Illustrated wherever possible, it begins with a section on general terms and short phases, followed by detailed chapter concerned with opening and cleaning cotton, carding, combing, drawing, spinning and doubling operations accompanied by well drawn machinery sections, components, gauges, etc. The same treatment is followed out in the chapters dealing with flax and hemp processing and spinning, also the jute and ramie sections of the industry. Terms frequently encountered in the woollen, worsted and shoddy trades are given extensive treatment, and the silk winding and spinning trade is similarly dealt with. The section on "finishing processes" is valuable but should be headed "subsequent processes" comprising as it does winding, ring and flyer doubling gassing, fancy twisting, etc. This minor criticism, however, does not detract in any way from the inestimable value of such a work to students, machinery designers, fitters, overlookers and managers, and all whose job it is to further international textile trade. It is a publication which will be in considerable use in all commercial and technical libraries, technical colleges and textile engineering firms and import and export offices.

D.A.

* * *

CHEMISTRY MAGIC. K. M. Swezey. Nicholas Kaye Ltd., 194-200 Bishopgate, London, E.C.2 (price 17s. 6d.).

Like a moth to a flame which boy with an enquiring mind—and what boy hasn't?—can resist the magnetic attraction of the one word "magic." In this particular case he will be well rewarded for few books treat such an involved subject as chemistry in so delightful and entertaining a manner. An entire absence of "dry-as-dust" academic jargon makes this well illustrated book one to be prized, in that it is a compact handbook of easy-to-do experiments specially worked out for groups of young chemistry enthusiasts. Arranged in a logical easily followed pattern, the demonstrations range all the way from how to make bakelite, rayon and synthetic rubber to chapters on atomic energy, paper chromatography and detection with ultra-violet light. In six main chapters the book commences with the workshop and basic laboratory technique, followed by experiments with metals — magnesium, chromium, mercury, etc. The next chapter, elements that are not metals, is followed by a section of over 30 pages on electrochemistry and combustion, including polymerisation. The remaining two sections are concerned with chemistry in the home, i.e., softening water, testing household products, etc., and detection by chemistry, a section that is completed by some very useful facts and formulas. Close on 200 fascinating experiments are dealt with in this excellent little volume. It should be in every school library and those parents with boys will be well rewarded by making a gift of this any time.

D.A.

* * *

MACHINERY'S HANDBOOK. Machinery Publishing Co., National House, West Street, Brighton 1 (price 72s.).

Published by the Industrial Press, New York, the fifteenth edition of this remarkable reference book of over 1,900 pages fully maintains its world-wide reputation for the selection and presentation of subject matter important to the ever increasing number of engineers. In thirteen main sections, the book contains many valuable mathematical tables and logarithms, formulas for areas and volumes and a concise explanation of the slide rule and its advantages and applications. An up-to-the-minute section on strength of materials——beams, pipes, rivetting, wire rope, springs, bearings, keys and keyways, sketches and couplings, gearing and gear materials, belts and pulleys, chain transmission, etc.—is followed by a fully detailed chapter on bolts, nuts and machine details. A section concerned with screw thread systems includes American and Whitworth standard thread form, sharp V-thread, unified and American screw thread standards, S.A.E. standard screw threads, British Association Standard thread (B.A.), metric threads, pipe threads and information on measuring screw threads. In these days of the increasing importance of precision requirements, the chapter on allowances and tolerances for fits becomes absolutely indispensable in any engineering workshop or assembly line. Of universal interest is the extensive information offered on all kinds of small tools, e.g., taps, dies for an infinite variety of work, milling cutters, reamers, boring bars, forming tools, punches and dies, broaching tools and files, steel for tools, jig and fixtures, and grinding, polishing and lapping techniques. Cutting speeds and feeds for turning receive adequate treatment and the chapter on steel alloys pin-points the most important information available on castings, machining, testing, heat-treatment of steel and non-ferrous alloys. The three remaining sections cover (*a*) electric motors, (*b*) weights and measures and (*c*) a most efficient index. In these days where more mills and factories have their own engineering sections, this book should be immediately available. It is the engineer's complete library of new knowledge and all technical colleges cannot afford to be without it.

D.A.

* * *

INORGANIC FIBRES. C. Z. Carroll-Porczynski. National Trade Press Ltd., 9 Kingsway, London, W.C.2 (price 57s. 6d.).

A feature of this book is its exhaustive documentation, a very necessary inclusion in a work planned to serve readers of varying degrees of knowledge of fibres so recently developed and of ever-expanding application. These bibliographical references include all the more significant post-war patents and the reports of recent research. Glass, asbestos and metallic fibres are dealt with according to their various forms and industrial uses, and the nineteen chapters contain 157 illustrations. An appendix reproduces Commercial Standard CS117-49 (Mineral Wool Insulation for Heated Industrial Equipment) of the U.S. Department of Commerce. This work is particularly valuable as it appears to be the first comprehensive study of these fibrous-inorganic materials.

S.P.S.

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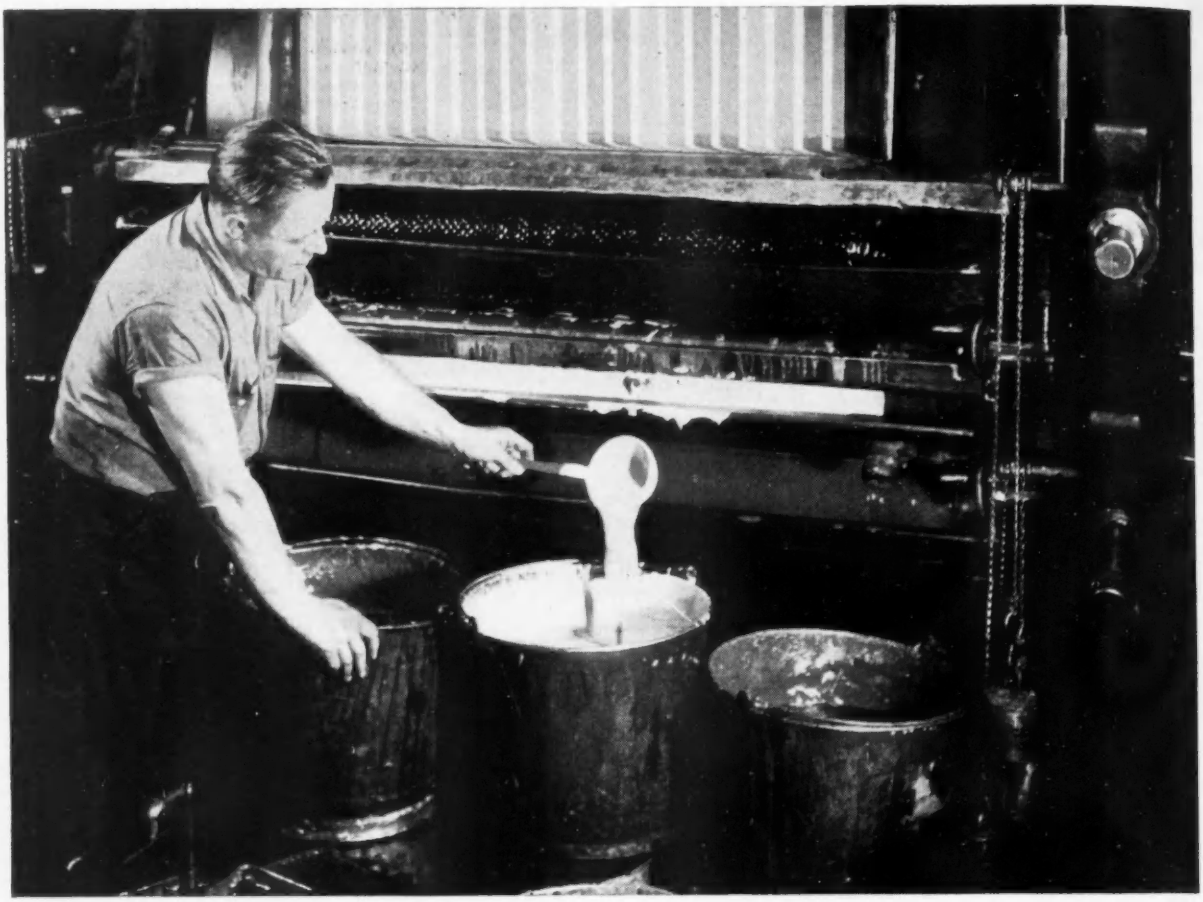
EUROPEAN VOLUNTEER WORKERS IN BRITAIN. By J. A. Tannahill. Manchester University Press, 316-324 Oxford Road, Manchester 13 (price 18s.).

The study is the product of a year's sabbatical leave from Mr. Tannahill's service in the Ministry of Labour, a period spent as a Simon Research Fellow of Manchester University. The author was in the fortunate, probably unique, position of having access to official records by reason of his normal occupation and also having time available for some 200 interviews with immigrants. The preface and first two chapters disclose the limitations within which the investigator had to work, and provide the historical background in Britain and in the countries of origin. It was quite a revolutionary change of policy when the Cabinet announced, in 1947, that displaced persons would be recruited to mitigate labour shortages in Britain and to supplement the influx of members of the Polish armed forces and their dependants. These schemes of recruitment and the detailed work of selection, carried out in competition with Commonwealth and foreign countries and in face of a stream of Soviet propaganda, posed many problems for the administration and many mistakes were made. Chapters 3, 4 and 5 tell how these difficulties were overcome and how approaches were made to industry and the trade unions for their support and help in E.V.W. settlement. The remainder of the book, unfortunately not indexed, is concerned with the subsequent processes of adjustment and assimilation, not only into a strange industrial environment but into the social life of the community. Twelve appendices contain statistical analysis and copies of relevant documents, including industrial agreements for the employment of E.V.W.s in the textile industries in which so many immigrants have found work.

S.P.S.



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What was needed was a simple method of better protecting the pigments against severe abrasion. Today's solution is one in which CHEMIGUM LATEX plays a major role. Easily modified with other materials and mixed into the colours at the printer's, CHEMIGUM LATEX helps form a protective coating which locks in the pigment particles. The end result sets the current pace in fastness to crocking, plus even further improving resistance to washing.

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High Polymer Resins, Rubbers, Latices and Related Chemicals for the Process Industries

Trade Literature

INSTRUMENTS IN INDUSTRY. Evans Electroselenium Ltd., Colchester Road, Halstead, Essex. Makers of the "Eel" photo-electric instruments, this company have published a series of leaflets which offer a comprehensive guide to determinations which can be achieved by those instruments applicable to the industry concerned. The company has also produced method sheets for use with the "Eel" absorptionmeter, the flame photometer and the colorimeter.

* * *

STEEL REVIEWED. A recent edition of *Mobil Industrial Review* published by The Mobil Oil Co. Ltd., Caxton House, Tothill Street, London S.W.1, reviews—in a remarkably efficient manner—the various phrases in the production of steel. Commencing with the revamping of iron ore for the furnace the publication covers iron ore conversion, manufacture and rolling of sheet and strip steel, manufacture of tinplate by electro-plating and the drawing of steel wire. In each case full colour diagrams plot the course of production.

* * *

"ANALMATIC" AUTO TITRATION EQUIPMENT. A brochure released by Baird and Tatlock (London Ltd.), Chadwell Heath, Essex, states that "Analmatic" Auto Titration Equipment covers a wide variety of titrations including those involving pH and "dead stop" and points. The results of the titration are usually recorded in digited form, but if required, chart recording can be provided. The equipment is adequately described in this very useful booklet.

* * *

GRIT COLLECTION. "The Clean Air Act of 1956 advises the users of furnaces burning solid fuel to take all precautions necessary to minimise the emission of dust and grit from chimneys." A leaflet available from the Sturtevant Engineering Co. Ltd., Southern House, Cannon Street, London E.C.4, describes the "Newgate" grit collector: specially designed to ensure a high rate of dust extraction, and to occupy little space. It consists essentially of a heavy duty induced draught fan, inlet box, primary collector, secondary cyclone, and a cyclone booster trunk unit to generate the differential pressure required to drive the concentrates through the cyclone circuit. The "Newgate" collector is made in several sizes to deal with boiler ratings from 2,000 to 20,000 lb. of steam per hour.

* * *

SEWING THREADS. The English Sewing Cotton Co. Ltd., Arkwright House, Manchester 3, have recently published a high quality booklet outlining in a straightforward, easy to read way—the company's activities and organization from doubling mill to merchant house. Packed with coloured and black and white half-tone illustrations the brochure should have a wide general interest.

MICRO SWITCHES. A brochure introducing the new Burgess V3 Micro-Switch is now available from Burgess Products Company Ltd., Micro Switch Division, Dukes Way, Team Valley, Gateshead 11. Entitled Micro Switchcraft, the booklet outlines the recent re-design of the V3 Switch, and includes tabulated characteristics, operational illustrations and informative installation drawings.

* * *

"TERYLENE" FOR FILTRATION. An excellently illustrated booklet has recently been released by I.C.I. Ltd., Fibres Div., Hookstone Road, Harrogate, Yorks. Starting with brief details of "Terylene's" physical properties, the booklet deals with the effect of various reagents on the fibre, the effect of moisture on the heat resistance of "Terylene" and the effect of immersion in acid. Valuable information is included in graph form and a useful buyers guide for filter and press cloths is on the back cover.

* * *

A STORY OF TEMPERATURE MEASUREMENT. Negretti and Zambra Ltd., 122 Regent Street, London W.1. This booklet traces the story of temperature measurement in an extremely authoritative and interesting manner commencing with Galen (A.D. 130, 200) who first measured temperature by numbers and proceeding through various stages of development to the accurate measuring instruments of today. In compilation, a number of recognised works on the subject have been studied and a bibliography is included for those who wish to delve further into this interesting subject.

* * *

"FACTS ABOUT ALBRIGHT AND WILSON." This is the title of a well-produced booklet issued this month by Albright and Wilson Ltd., 1 Knightsbridge Green, London, S.W.1. The booklet, illustrated by numerous half-tones, is printed in three colours, and describes very briefly the structure of the Albright and Wilson group of companies and the activities of some of the larger manufacturing companies within the Group.

* * *

MERCHANDISING VISION. The summer number of this magazine by British Cellophane Ltd., Henrietta Place, London, W.1, has several new ideas and information on packaging and merchandising. The range includes foodstuffs, toys, etc., also an excellent presentation for two terry towels overwrapped with printed "Cellophane" cellulose film.

* * *

TECHNICAL OILS FOR WORSTED PROCESSING. Benjamin R. Vickers and Sons Ltd., Leeds 6. A neat pocketed folder issued recently contains eight information sheets as follows: fibre processing (general); carding or preparing; oils for carding; combing and oils for combing; drawing and spinning; products for drawing and spinning; conditioning worsted hosiery yarns; technical oils, storage, etc.

RUBBER LATICES. A new technical booklet describing the properties, compounding and applications of Hycar nitrile rubber latices has recently been published by British Geon Ltd., Devonshire House, Piccadilly, London, W.1. Hycar latices are water dispersions of butadiene acrylonitrile copolymers and they are compatible with a wide range of compounding ingredients. They possess a high adhesive strength, are excellent bonding agents and in addition are easy to use. Typical uses include the impregnation, coating and printing of textiles, as adhesives and finishes for leather and non-skid backing for carpets. The publication tables the properties of Hycar latices, together with compounding methods and applications.

* * *

ADHESIVES. A range of polyvinyl acetate emulsions is now in full production at the new factory of National Adhesives Ltd., Slough, Bucks. Standard polymers, complex polymers, and internally plasticised copolymers are now produced. They include an interesting range of p.v. emulsions which have been in wide use in Canada and America for some years. As well as extending the wide range of adhesives already produced by the company, the new resins open up new fields of development in the textile, paper, etc. industries.

* * *

GUIDE TO LUBRICANT. The publication "Molybdenised Lubricants," No. 3D, by Rocol Ltd., Rocol House, Swillington, near Leeds, is an excellent guide to the use of a vast range of molybdenised lubricants for industry ranging from aircraft at one end to watches and clocks at the other. The firm point out that in the space of just under a decade they have invented 28 specialised lubricants using molybdenum disulphide.

In the field of silicones, Rocol claim to have achieved the "happy marriage" between the excellent thermal and physical qualities of silicones with the lubricating properties of molybdenum disulphide, thus providing excellent lubrication at the low and high temperatures demanded by many modern industrial products where petroleum products are disintegrated or disappear. The publication explains what molybdenum disulphide is and why. The full range manufactured are described in terms of easy comprehension. The range includes general purpose lubricants, molybdenised greases, molybdenised lubricating oils, molybdenised fluids, "Molysils," molybdenised diesters, "Molycue," "Molycue" greases (molybdenised polyalkalene glycals), "Moly Block" greases and "Moly Spring" lubricant.

* * *

RANGE OF PHOTO SWITCHES. A new data sheet, PR, from Elcontrol Ltd., Industrial Electronic Engineers, Wilbury Way, Hitchin, Herts., introduces a recent range of photo-relays, associated viewing heads and light sources. Outstanding features are the small size viewing head and light source units enabling photo-electric control to be applied in complex machinery where space is limited, and the new style construction adopted for the relay unit which embodies an unpluggable chassis mounted on a cradle secured, in turn, to the lower half of the case, thus simplifying installation and servicing.

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the NEW and revolutionary "POLYMATIC" BRAND PLASTIC PICKERS

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A COMPLETE RANGE OF "BENKA" BRAND TEXTILE AND MECHANICAL LEATHERS

Export Opportunities

U.S.A.:
Nylon, etc., Rope

Rickert, Wessanen and Laan Inc., 730 Fulton Street, New Orleans, La., would like quotations for the following:—

Nylon rope, Plastic dipped rope, Polyethylene rope } Sizes ¼, 5/16, ⅜, 7/16, ½, ⅝, ¾, ⅞ and 1 in.

The firm want to purchase outright and maintain complete stocks and the U.S. rate of import duty is 25 cents per pound and 30 cents *ad val*. The company are distributors and stockists of machinery for industrial and marine trade. Suppliers interested should write direct, and quotations should show f.o.b. and c.i.f. prices in dollars. A copy of offers made and sent to the British Consulate-General, 403 International Trade Mart, New Orleans 12, would enable the officer to pursue the enquiry.

India:
Tracing Cloth

The Indo-Japan Vacuum Bottle Co. (India) Ltd., 1 Dufferin Bridge, Mori Gate, Delhi, wish to find a U.K. firm willing to associate with them in the manufacture of tracing cloth. Established in 1954 as a private limited concern, their new factory at Faridabad has spare space and the firm are looking around for a profitable means of using it. The manufacture of tracing cloth would be either under a royalty agreement or by capital participation. The main idea seems to be that the overseas firm should supply the machinery and send a technician for a number of months to ensure high quality production. Manufacturers interested should write direct, also notify the U.K. Trade Commissioner, Eastern House, Man Singh Road, New Delhi.

Western Germany:
Woollen, etc., Piece Goods

Mr. G. Kultschytzky, Stuttgart, Urbanstrasse 31B, wants to contact U.K. manufacturers of suitings. He specialises in buying up stocks direct from mills. These are usually end of runs, part orders not taken up and any other cloths out of season or otherwise difficult to sell. Manufacturers interested in this enquiry should write direct, also notify the British Consulate-General, Sophienstrasse 24B, Stuttgart.

U.S.A.:
Linen Table Mats, etc.

Bess Manufacturing Co., 2630 N. Howard Street, Philadelphia 33, wish to receive quotations from U.K. manufacturers of lace doilies, table mats and chair-back sets. They are also interested in quotations for Irish linen table runners. Details of the requirements are: Lace—15 × 36 ins., 15 × 45 ins., 15 × 52 ins., 15 × 63 ins.; 9, 12 and 20-in. round doilies; 10 × 14 ins. and 12 × 18 ins. oblong doilies; 3-piece chairback set. All items to be of pure Irish linen in white only, finished with 1 in. hem on all four sides with hem-stitching. 16 × 36 ins., 16 × 45 ins., 16 × 54 ins., 10 × 14 ins. and 12 × 18 ins. oblong. 12 × 12 ins. square.

Started in 1939, the company are manufacturers of decorative linens and laces and have their own sewing machines for finishing imported nylon and batiste materials. Twelve chain stores account for 75% of the firm's sales although they have some 250 other accounts throughout the country. Manufacturers interested should write direct with quotations showing both f.o.b. and c.i.f. prices in U.S. dollars, also copy their correspondence to the British Consulate General, 12 South 12th Street, Philadelphia 7, Pennsylvania, to enable the enquiry to be pursued.

Switzerland:
Tents

Magazine zum Globus, A.G., Eichstrasse 27, Zurich, would like offers from U.K. manufacturers for tents for two, three and four people. They are a joint stock company entered in the Swiss commercial register in 1907 and large department stores are maintained in Zurich, Aarau, Basle, Chun, St. Gall and Berne, besides which they also have subsidiary companies. Manufacturers interested should write direct, also notify the British Embassy, Commercial Department, Willadingweg 83, Berne.

U.S.A.:
Haberdashery

Leonard A. Ostrer Co., 94 Stewart Street, Seattle 1, Washington, are interested in importing U.S. bias tape, seam binding, etc. Started in 1947 to sell to wholesalers, jobbers and chain stores throughout the U.K. They employ nine salesmen. Suppliers interested should write direct with quotations showing both f.o.b. and c.i.f. Seattle prices in U.S. dollars, also copy their correspondence to the British Consulate-General, 1805, Exchange Building, Seattle 4, Washington.

Malaya and Singapore:
Cotton Shirting

International Corporation, 95-A, High Street, Singapore 6, are interested in obtaining the agency of a U.K. manufacturer of cotton shirtings in plain colours and stripes similar to samples which are available for inspection at the Board of Trade North Western Regional Office, 76 Newton Street, Manchester 1.

They are an Indian firm who commenced business in Singapore in 1950 as importers, exporters and commission agents. With head office in Bombay they offer coverage for the whole of Malaya including Singapore. Manufacturers interested should write direct, also notify the U.K. Trade Commissioner, P.O. Box 620, Singapore.

Malaya, Borneo:
Various Textiles

Harrington & Co. (Far East) Ltd., P.O. Box 641, Singapore, wish to represent U.K. manufacturers of textiles. As a recently formed subsidiary of Guthrie and Co. Ltd., coverage of the territory is guaranteed by the parent company's widespread system of branches. Manufacturers and/or their export agents interested should write direct, also notify the U.K. Trade Commissioner in Singapore, P.O. Box 620, Singapore.

South Africa:
Poplin and Satin Piece Goods

J. G. Train and Co. (Pty.) Ltd., 5 Klamson Buildings, 149 Commissioner Street, Johannesburg, are interested in obtaining U.K. agencies for shirting poplins, satin drills, industrial cotton and filter cloths.

Established in 1934 they represent over twenty U.K. firms in various goods and have offices in Johannesburg, Cape Town and Durban and sub-agents in East London and Port Elizabeth. Suppliers interested should write direct, also notify the U.K. Trade Commissioner, Pritchard House, Pritchard Street (corner Von Weilligh Street), Johannesburg.

Netherlands:
Woollen and Worsted Piece Goods

Roger L. Cats v/h J. A. Cats and Co., Westerhoutpark 6, Haarlem, wish to contact a U.K. manufacturer or wholesaler for whom they could handle, as agents, a range of woollen and worsted piece goods in middle to high-class qualities for men's and women's wear. The Haarlem firm would be prepared to buy on their own account. Established in 1910 they are importers and wholesalers of woollens, shawls, raincoats, etc. Suppliers interested should write direct, also notify the British Embassy, Commercial Department, Lange Voohout, 32 The Hague.

South Africa :
Cashmere Cloth

H. E. Gray (Pty) Ltd., 704 Ottawa House, 94 President Street, Johannesburg, are interested in obtaining a U.K. agency for cashmere wool cloth of approximately 36 ins. width for the manufacture of nuns' uniforms. Established in 1931, they at present represent over 20 U.K. firms and have a full time office in Johannesburg and Cape Town and a temporary office in Durban. Three travellers are employed. Suppliers interested should write direct, also notify the U.K. Trade Commissioner, P.O. Box 10101, Pritchard House, Pritchard Street, Johannesburg.

Netherlands:
Textiles, Chemicals, etc.

Mr. H. Hesselink, a Dutch businessman, recently retired from the directorate of one of the most important manufacturing concerns in the Netherlands, wishes to act as agent for a U.K. company or group of companies. He has excellent connections with leaders in many industries in the Benelux countries and would represent individual U.K. manufacturers on a commission basis in textiles, plastics and chemicals. Interested manufacturers should write to Mr. Hesselink at Gevers Deynootweg 119, Scheveningen, Netherlands.

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BOAC's Shippers' Service Unit offers you something entirely new in air cargo service. Now, from any point in the U.K., your telephone becomes a direct link with BOAC's unique team of freight experts—*and the whole procedure is streamlined.*

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BRITISH OVERSEAS AIRWAYS CORPORATION

Textile Trade and Prospects

Trade in the Doldrums

Events in the cotton industry show little change for the better and both spinners and manufacturers begin to wonder if anything of real value will emerge from the talks with the Hong Kong manufacturers. In the meantime, sales of yarn and cloth just "tick over" at pathetically low levels. A little more replacement ordering continues to go through but this business is more or less confined to small volume with accent on quick delivery. The amount of long term booking, small in any case, is made more difficult by some firms not taking the regular production agreed on with the result that stocks pile up to give greater problems in warehousing, etc., demands.

In yarns, what business has been negotiated has been confined mainly to standard weaving qualities in medium and coarse carded counts in cop, hank, cheese and cones. The closure of several spinning mills in the last few months has had little effect in stimulating sales amongst those fortunate enough to keep running. The same "hand-to-mouth" business carries on with small hope of any improvement in the near future. Combed qualities are still very badly supported and Bolton-type mule yarns in poor request. Some hosiery numbers have improved slightly but the position all through is far from satisfactory. Speciality yarns—blended fibres and doubled types, also novelty effects continue to attract buyers but here also new business becomes increasingly more difficult to get.

Cloth sales on the whole might be slightly better but still very far from satisfactory. Orders on home trade account are now probably lower than they have ever been and taking off the brakes on hire purchase will not improve matters in the least. As a matter of fact it might even make things worse from the textile viewpoint, in that the more demand there is on the housewife's purse the less will be the amount spent on textiles—even necessities. Dress cloths in new printed and woven designs have been in very modest request and the volume has been fairly well divided between cotton, rayon, nylon, etc., qualities. Cloths in the top-most price brackets in some jacquard woven styles have found better favour but the turnover is poor. Medium and low priced cloths are anything but easy to sell. Furnishing fabrics are also in limited request with probably a little better interest in screen and roller printed designs in contemporary styles. More inquiry would be welcomed for traditional dobby and jacquard cloths.

Household textiles are moving slowly, the retail sales only serving to keep a sluggish stream moving from mill to shop. Replacement buying is taking place slowly in many lines of sheets, cotton blankets, table-cloths and towels. Terry cloths, in general, manage to keep moving along helped, no doubt, by imaginative designing and excellent colour arrangements.

U.K. Wool Stocks and Top Exports

Stocks of wool in the U.K. at August 31 were 233·7 million lbs. (clean), states the Wool Industry Bureau of Statistics. This was about 12·8 million lbs. higher than at the end of July, but 31·8 million lbs. lower than a year earlier. The government stockpile remained unchanged at 63 million lbs. Top stocks in the U.K. at August last were 45·1 million lbs., or 6·2 million lbs. lower than at the end of July and 5·9 million lbs. lower than a year earlier.

Exports of wool tops from the U.K. are heading for a new record. At the end of nine months—according to recent Trade and Navigation Accounts—they totalled 66·4 million lbs., or nearly 3 million lbs. more than in the corresponding period of last year. If the recent rate of export can be maintained, the total for the year should exceed last year's record total of 83·2 million lbs. An important factor in this year's expansion is the considerable increase in shipments of tops to China. That country has thus far taken nearly 20% of Britain's total exports of tops this year, and the 12·6 million lbs. of tops shipped to China to date is 50% more than the total supplied to her during the whole of 1957. China is the largest overseas customer for tops from Britain, the two next largest being India and Canada with 8·8 and 6·7 million lbs. respectively. Imports of raw wool into the United Kingdom continue to reflect the difficult trading conditions which have characterised much of the year. In nine months of 1958 they totalled 454 million lbs. (actual), compared with 530 million lbs. in the corresponding period of 1957. The term "actual" means that greasy wool is recorded at its greasy weight and scoured wool at its scoured weight.

New Zealand's wool selling season opened well at Dunedin with keen competition and prices for halfbreds and crossbreds higher than had been expected. There was a healthy tone in the market, and the sale was regarded as a promising augury for the rest of the season. With rates 1d. to 2d. higher than in May, dealers were said to be optimistic. The New Zealand Wool Commission in London reported there was a good market, with fairly general competition from the Continent, including eastern Europe, and some buying on behalf of China. There was a good clearance. Purchases by the Wool Commission in support of its floor prices, were negligible. Other reports stated that most clips brought 1d. to 2d. per lb. above the floor price of 33d. A full bench of buyers attended, with Bradford giving some support for topmaking wools and local mills taking the bulk of the best fine wools. American interest operated to a limited extent.

Linen Trade Review

There has been a progressive increase in the volume of orders booked in recent weeks. While this has fallen short of normal autumn coverage it has, for the time being, relieved manufacturers of the problem of keeping stocks in bounds, while also maintaining production at an economic level. Demand covers a wide range of goods, and with orders generally small, as retailers are inclined to book only for immediate cover, the margin of profit to the producer is low.

This expanding trend of short term booking has created new problems relative to the economics of the industry which, although increasingly evident since the advent of the buyer's market, were not generally considered in connection with re-equipment schemes, so that in many mills the effect of the latter has been to aggravate, rather than to solve them. As usual diverse views are held as to the appropriate solution, and while much talking is being done evidence that they are tending to resolve themselves is found in the balance sheets of the smaller individually controlled concerns which, by virtue of their greater mobility and adaptability are able to handle small orders more profitably.

Mr. Harold Macmillan's advice to manufacturers and operatives during his recent visit to the West Midlands has particular relevance to the linen manufacturing centres in Scotland and N. Ireland. Speaking with reference to the future for industry in this country he said: "The only thing that matters today is quality. . . . We could not prevent new under-developed countries from producing cheaper textiles, we had to compete with something better—quality." The phenomenal expansion of textile production in many former customer countries has made competition in world markets a "free for all" with the advantage to those who can most readily adapt their tactics to the frequent and rapid fluctuations in consumer demand.

While the markets for all linen goods at home and overseas are contracting under pressure of competition of rival textiles the rate shows evidence of accelerating, due to unresolved problems within the industry itself. Of these the one most vital to its future wellbeing relates to raw material supplies. The position today is that production of flax grown in N. Ireland has declined from over 19,000 tons in the peak war year 1944 to a negligible 150 tons in

Yarn treated with SYTON is *stronger!*

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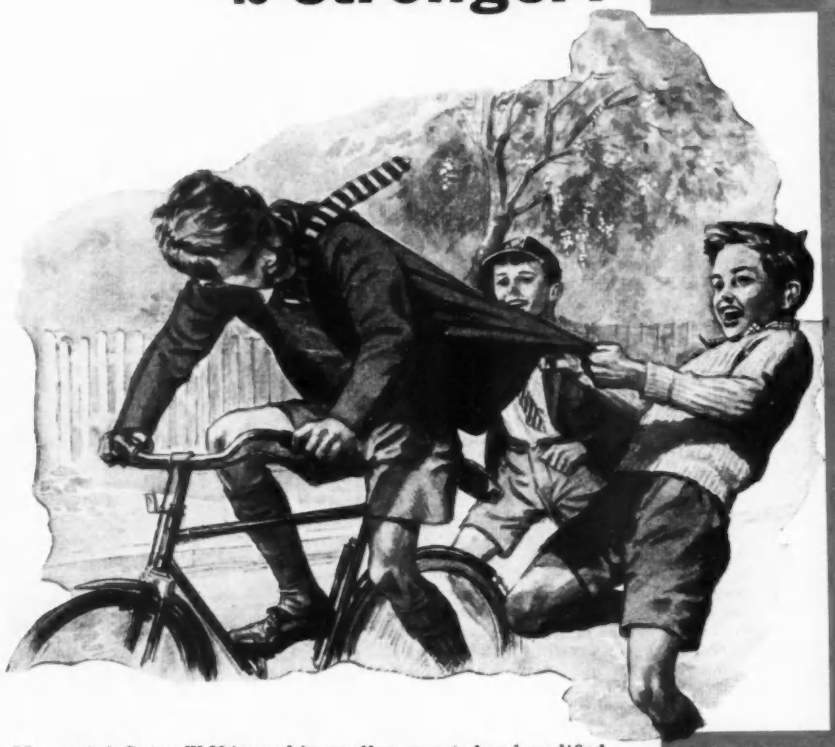

Monsanto's Syton W.20 is used in woollen, worsted and modified systems to produce stronger, more uniform yarns from all-wool and mixture blends. Syton W.20 is *the* anti-slip agent: it reduces waste and "ends down", improves quality, does not affect dyeing or finishing.

Syton W.20 is one chemical from the range Monsanto offers industry: a range to which Monsanto is constantly adding new, better products, as well as improving those already in use . . .

Syton W.20: anti-slip agent.

Syton 2X: for finishing woven fabrics; gives increased strength and abrasion resistance.

Santobrite: for preservation of sizes and short-term preservation of yarns and fabrics.

We also welcome your enquiries for the following imported products which are manufactured by Monsanto Chemical Company, U.S.A.

Catalysts AC, AC2 and AC4—for rapid and uniform resin cure in melamine and urea resin treatment of fabrics.

Resloom HP and Resloom E.50—Impart shrinkage control and wrinkle resistance and durability to natural and synthetic fabrics.

Stymer LF—a loom-finish size for acetate rayon.

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the current year, and that despite the existence of a Flax Development Committee charged with the task of investigating "to what extent flax capable of competing in quality, handling and price with supplies coming from elsewhere can be remuneratively produced in this country." During the years of its existence, in which it has expended approximately £350,000, the fibre flax acreage in N. Ireland has declined from 20,000 to less than 1,000. While the importance of an adequate supply—say six to eight thousand tons—of home grown fibre to the economic wellbeing of the linen industry is freely recognised, the approach to the problem has obviously been wrong. The most urgent need is to stimulate a demand by the spinning section for home grown fibre and an expansion of production and improvement in quality range will follow in course.

Concurrent with the decline in quantity of home grown flax, and possibly of even greater importance to the future of the linen industry, has been the progressive deterioration in quality. Competition by rival textiles has been felt most keenly in the low and medium range household and dress linens, so that demand for all linen fabrics is concentrating more and more on quality lines which require high grade flax, and of which available supplies are inadequate. West European markets constitute the only source of supply of this material, and it is unlikely that these will be seriously challenged in the foreseeable future by supplies from the Soviet Union.

Latest reports from Continental flax markets indicate increasing activity in the scutch mills. While deliveries of scutched fibre are still substantially below the normal winter level they are sufficient for present requirements. Scutchers and buyers are playing a waiting game, the former limiting output and selection in an effort to boost prices, the latter adjusting their purchases to immediate needs to relate transactions to supplies.

Linen damask constitutes a substantial item in recent indents. The extension of its end use from table covers and furnishings to dress fabrics has been a considerable stimulus to demand. Statistics relative to linen exports recently made available by the N. Ireland Ministry of Commerce indicate a serious decline in demand for linen handkerchiefs, exports of which totalled 621,912 dozens during the first seven months of 1956, as against 442,713 dozens in the corresponding period of 1958. The upward trend of linen yarn exports, which increased from 25,987 cwts. during the first seven months of 1956 to 36,226 cwts. in the same period in 1958, while gratifying to spinners, has been mainly responsible for the casualties incurred in the weaving section in recent times.

Silk, Rayon and Man-Made Fibres

The past month has been one which certainly gives rise to a slightly more optimistic outlook. The demand for all-rayon goods, especially filament, is not as good as it might be but blended fabrics are in good request. Blends of the newer fibres with cotton are accounting for an ever-increasing proportion and blends, too, of rayon with nylon and rayon with cotton are the subject of encouraging inquiry. The triacetate fibres are extending their influence on the Lancashire section of the trade, and dress goods from blends of viscose and triacetate find a ready response. The dress goods trade on the whole is better than for some time and the changing styles have helped fabric producers.

In the Yorkshire sections blends of "Terylene" with worsted and woollen cloths are very popular and the call for fabrics produced on the woollen system extends to articles other than for clothing. In the furnishing fabric field a strong demand exists for blends of "Fibro" with wool. In ladies' suitings there is a steady call for fabrics including various proportions of rayon. Effects obtainable with blends of wool and rayon and in some cases three fibres interest makers-up alive to the changing of fashion demands.

News from Leek and Macclesfield areas is more encouraging. The pockets of under-employment are less and weavers continue fairly well-employed. Makers-up report stimulated demand for ladies' fashion goods, especially underwear, and overtime is being worked at some factories.

The demand for bulked yarns appears to have eased slightly in recent weeks but the view is held that any fall-off is temporary and probably due to a hold-off of buying rather than any pronounced preference for the conventional yarns. Dyers and finishers are fairly well employed, but activity in this section is extremely competitive, with the accent on delivery and service. The rather quiet spell in the smallwares section of the trade has ended with orders arriving in larger quantity than for some time, and most sections of the trade have been employed on Christmas orders for some considerable time. Repeat business is reported to be coming in for some concerns against delivery, an anticipation evidently by retail sections of plenty of spending by the public on clothing.

From the Midlands, the news is of a steady demand for all-nylon and all-"Terylene" yarns for the men's half-hose trade, and of blends of cotton and nylon for men's and women's undergarments in preference to blends of cotton and rayon which are, however, still being produced in appreciable quantities for the cheaper end of the trade. Demand for coloured nylons is reported to be on the increase, and crepe nylons have had a good sale in recent weeks.

Jute, Fibre, Yarn and Fabrics

The raw jute market has declined steadily during the past month with an average fall of about £15 per ton since the beginning of August. Much of this decline in values appears to have been due to political unrest in Pakistan and not actually to the law of supply and demand. U.K. spinners have been purchasing fairly steadily during this period and have secured about one-third of their yearly needs. In comparison to the total sales of jute by Pakistan, Dundee spinners have secured more of their requirements than spinners in other countries. The Pakistan authorities have been perturbed about this fall in price of their main cash crop and meetings have taken place to discuss the reasons for this decline in value but so far no announcement has been made. There has been a feeling for some time that there was the possibility of minimum export prices being fixed. The last time these were in force was during season 1956-57 and since then values have been controlled entirely by the Jute Board through the E.P.C. prices. These, of course, could fluctuate from day to day according to the supply and demand position. The position at present is obscure. Offers are not being freely made of jute, but this is only to be expected due to the unsettled conditions in East Pakistan and there is also a considerable hold-up in cables dispatched from that country. A few offers of the fibre are being made and the prices quoted show little change with Mill Firsts at £101, Mill Lightnings at £85, Mill Hearts at £75 and grade Hearts at £62, c.i.f. U.K., October/November shipment. Grade Tossa-2/3 is available at £101 and grade Tossa-4 at £90 with Continental Tossa-2/3 at £84. Crack Daisee-2/3 remains at £90 and grade Daisee-2/3 at £83, c.i.f. U.K., October/November.

U.K. spinners have shown a fair amount of interest in raw material supplies and a steady business has taken place at the lower level of values. Spinners are now well bought for shipment but during the past month some spinners have been rather short of certain grades of the fibre. This has meant that buying had to take place of spot material and some very high prices had to be paid. In some instances this amounted to nearly £10 per ton above the shipment rates. However, this temporary shortage is now being overcome as contracts already placed are being implemented. Demand for raw jute from the Continent has been fairly steady and a fair business has taken place during the past month. Spinners have purchased more than their normal cut-up on the falling market and they are now pausing because of the obscure outlook of the future trend in values. The Calcutta goods market became much firmer at the beginning of October and prices in the near shipment position showed a considerable advance.

Quotations are now at 61s. 3d. for 10 oz. 40 ins., and at 45s. 10d. for 7¼ oz. with 11 oz. 45 ins. at 67s. 7d. per 100 yds. f.o.b. Calcutta for November shipment; B twills were quoted at 146s. November. Prior to the recent rise in values of Calcutta goods, the Indian Jute Mills Association advised members to purchase raw material to the extent of three months' consumption in order to prevent prices falling too far. At the same time the I.J.M.A. reaffirmed its intention to maintain the minimum price agreement for goods which came into force in February this year. The jute goods manufacturing industry in East Pakistan has been passing through difficult times and the balance sheet of one large concern there shows that for the year ended December 31, 1957, a net loss of Rs. 9·3 million was sustained. For some time now there have been complaints from manufacturers in Pakistan that the cost of raw material has been too high to allow sales of goods to be made at a competitive price in world markets. The main supplier of jute goods is, of course, India, and there too, substantial financial losses have been made during the past few years.

There has been an improvement in demand for yarns in Dundee during the past month. Due to cheaper raw material the selling rates of yarns have been reduced and this has attracted more interest from consumers. Many spinners are now fully booked for delivery at least two months ahead and business has taken place for delivery into next year.

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Notes and News

New Headquarters for Wool Bureau Inc.

The Wool Bureau Inc. is to move its New York headquarters to larger offices, occupying the entire seventh floor of a new 24-storey building at 360 Lexington Avenue. The extra space is required because of the rapid expansion in the Bureau's activities. A staff of more than 60 will be accommodated, covering the departments of publicity, women's wear promotion, men's wear promotion, education, science and technology and economics and statistics. The move from the existing headquarters in West 46th Street will be made in January.

Change of Address

I.C.I. Fibres Division has moved its London office from 149 Park Lane to 11 Bruton Street, W.1. Telephone: VICtoria 4444.

Cotton Board Courses

The Cotton Board's Productivity Centre at Fielden House, West Didsbury, will run a new training course on work simplification in the office. The course lasts four days and is in two parts. The first three days are November 25, 26 and 27 and to give course members the chance to try out the new ideas and then discuss any problems that may have arisen the last day of the course will be on December 10. During the first three days of December and on the 8th and 9th the Centre is conducting a cost and expense control course for executive spinners and weavers. This is a rigorously practical course and aims at ensuring that the firm's representative who attends can introduce and maintain the procedures advocated by the Centre. A one day meeting for Directors to enable them to "catch up" on modern cost procedure will be held on November 26.

Another one day meeting on a different aspect—on management accounting—has been planned for November 19 at the Midland Hotel, Manchester.

Towards Better Carpets

The results of a programme of research work carried out by the Wool Industries Research Association and the Technical Advisory Sub-Committee of the Federation of British Carpet Manufacturers have recently been published. One aspect of the work was a study of the relative merits of East Indian, New Zealand and British wools for carpets, and the very interesting confirmation was made that, because of medullation, the density of the East Indian wool was about 8% less than that of the other common types. This means that a carpet pile made from East Indian wool may have as much as 8% greater bulk than one made from an equal weight of New Zealand or British wool: a bulkier wool goes toward making a better looking and better feeling pile, and this gives a scientific explanation of one reason why East Indian wool is so much sought after for carpet production.

The problem of improving standards of carpet performance is one which has long engaged the attentions of the Federation's technical committee, and practical trials with dyed and undyed carpet have confirmed that the process of dyeing does reduce the wear life of the resultant carpet. To find out basically how and why this damage is caused so that steps can be taken to minimise it, a more detailed study of the effects of different dyes and dyeing methods on carpet performance is being carried on.

Higher National Certificate in Textiles

The Textile Institute has now decided that it will consider appropriate higher national certificate papers in textiles at an agreed level of attainment, for assessment for exemption from the Institute's Part 1 examination for the Associateship (A.T.I.). "This should provide a valuable route by which part-time students become chartered textile technologists," states the Institute.

Textile Institute Developments

As a result of recent requests, Council of the Institute has agreed to the formation of a section in Brazil and official recognition, has also been granted to a South American Panel which is to be established in the near future. Overseas' sections of the Institute already in existence are in Bombay, Calcutta, Dublin, Transvaal, Victoria (Australia), and Panels function in the United States of America, Canada, India, Australia, South Africa, Scandinavia and Finland.

Wool Maintaining its Hold

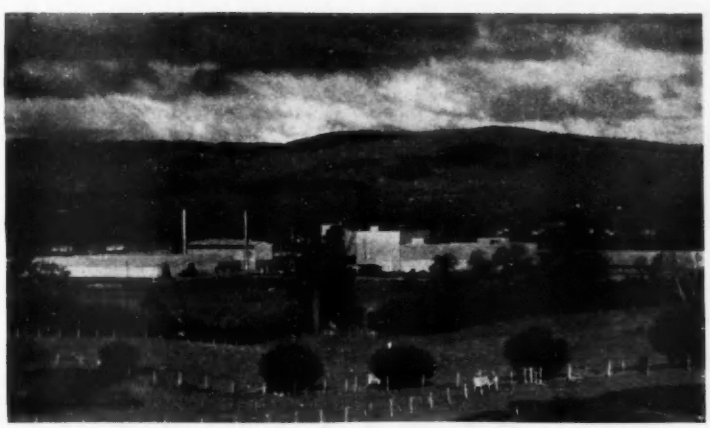
The competitive power of wool was being maintained through an increasing number of treatments, said Professor J. B. Speakman, head of the department of textile industries at Leeds University, on his arrival in Pretoria. He is visiting the Union at the invitation of the South African Wool Board to advise on the future development of the South African Wool Textile Research Institute at Grahamstown. It should not be assumed that the fall in world wool prices was a result of competition from man-made fibres, he said. The cause was a general slackening in the demand for textile materials. Wool was maintaining and perhaps increasing its hold on the textile market. It should be emphasised that, in spite of the large and rapid expansion in man-made fibres, wool's share of the world's total consumption of apparel fibres had remained remarkably steady over the last 20 or 30 years. Progress in wool textile technology, which had enabled the industry to offer products more attractive in appearance and more suitable for particular purposes, had been helpful, continued Professor Speakman.

New Zealand's Wool Cheque

New Zealand's wool clip in the 1957/58 season was sold at an average price of 41·16d. per lb. This is a reduction of 13s. 6d. per lb. on the previous season's price of 54·76d., states the chairman of the New Zealand Wool Commission, Mr. G. A. Duncan. Total receipts for the season were £85 million, compared with £112 million in the previous season.

Canada: Upholstery Tapes

Ideal Upholstering Co. Ltd., 299 Marien Avenue, Montreal East, are seeking sources of supply of upholstery tapes to purchase on a direct shipment basis. The main demand locally is for the natural and white cotton tapes, while there is also a brisk demand for the novelty tapes with "Lurex" thread. To be competitive these tapes



This picture shows a general view of the new factory of British Nylon Spinners (Australia) Pty. Ltd., near Melbourne, which will be opened officially on November 12 by General Sir Dallas Brooks, Governor of Victoria. The factory started production early this year and has already achieved 70% of its target output of 5,000,000 lbs. of nylon yarn a year. Full production will be reached early next year

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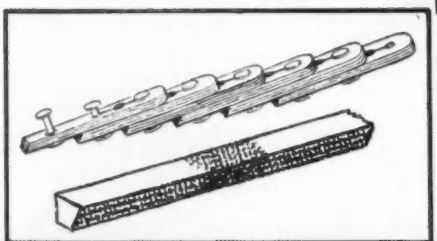

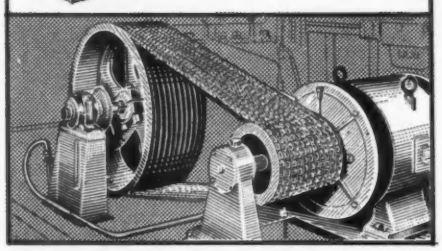

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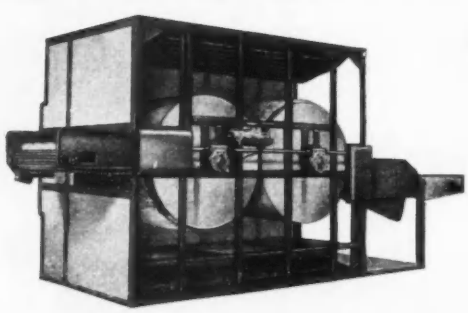

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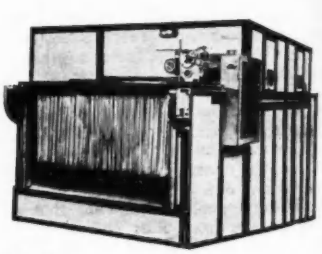

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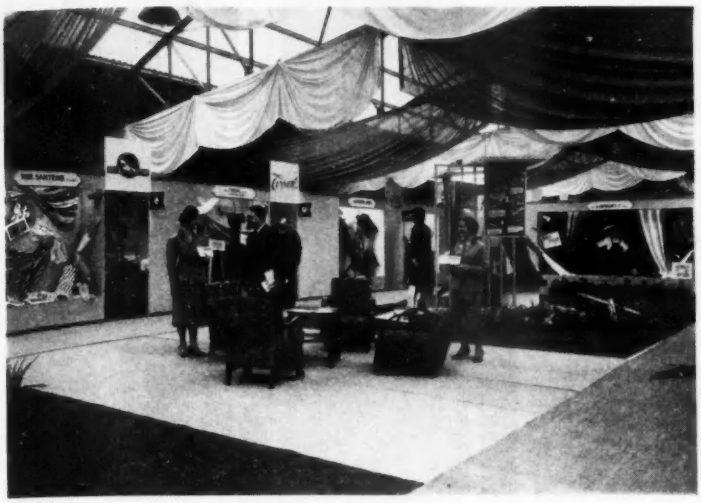

A central view of Textirama, the trade show of the Belgian textile and clothing industry, held for the first time within the orbit of the Ghent fair

would have to land in Montreal, duty paid, for approximately $1.30 per gross yards natural, $1.80 for white, and $2.50 for "Lurex." The approximate total annual usage of white and natural tape would be around 2,000 gross yards, while the "Lurex" type tape would also run in the region of another 1,000 gross yards. Manufacturers interested should write direct, also notify the U.K. Trade Commissioner, 1111 Beaver Hall Hill, Montreal, P.Q.

Change of Title

Fredk. A. Power and Sons (Box Strapping) Ltd., Landor Street, Birmingham 8, manufacturers of automatic and hand strapping machines for packages of all types will in future be known as Power Strapping Systems Ltd.

U.S.A.:
Glass-Fibre Cloth

The G.T.R. Construction Co. Inc., 1106 So. Columbus Blvd., Tucson, Arizona, is seeking U.K. sources of (*a*) glass-fibre cloth and glass-fibre mat, (*b*) resins for glass-fibre, particularly for boat building but also for other purposes, and (*c*) sails.

Mr. Rekerdre has decided that there is a good future in the manufacture of glass-fibre boats for use particularly in the Gulf of California and in the Caribbean district as well as on the lakes in Arizona. He is now exploring the possibilities and looking for sources of supply of raw materials. If investigations confirm his present ideas he would probably start boat building at Tucson but would later expand to Caribbean ports, including Puerto Rico or the Virgin Islands. Manufacturers interested should write direct, also copy correspondence to the British Consulate-General, Commercial Section, 448 South Hill Street, Los Angeles 13, California, so that the inquiry may be pursued.

New Companies

Pictured at the "Minibition" recently held by the Purchasing Officers Association, in Southport. On the stand of Loxhams Engineering Co. Ltd., Blackburn, Mr. A. Bucknall (development engineer), is showing the new Ionic mechanical lubricator. An earlier model has already been severely tested in many textile plants. This new unit now has further advantages with an entirely new method of pumping lubricating oil. Shown in this photo are the plunger and body of the pump unit, the plunger has been fitted with a nylon pressure section

F. and P. Textiles Ltd. Private. Reg. July 21. Capital £2,000 in £1 shares. Manufacturers and dealers in cloth, etc. Registered office: 141 Stamford Hill, N.16.

Gildonese Co. Ltd. Private. Reg. Aug. 20. Capital £1,000 in £1 shares. Manufacturers and dealers in hosiery textiles, silks, art silks, etc. Registered office: 2a The Broadway, Penn Road, Beaconsfield, Bucks.

Treforest Furnishings Ltd. Private. Reg. Aug. 22. Capital £1,000 in £1 shares (120 "A" and 880 "B"). Manufacturers and dealers in furnishings, curtains, etc. Registered office: 8 Great Titchfield Street, W.1.

Higherford Weaving Co. Ltd. Private. Reg. Aug. 28. Capital £5,000 in £1 shares. Cotton manufacturers and weavers, etc. Registered office: Higherford Shed, Barrowford, Lancs.

Macleod's Tweed Company Ltd. Private. Reg. in Edinburgh Sept. 9. Capital £10,000 in £1 shares. Manufacturers and dealers in Lewis and Harris Tweed, yarn merchants, etc. The directors are: A. Macleod, A. M. Macleod and K. Macleod, all of Glen House, Shawbost, Lewis.

Trans Canadian Exports Ltd. Private. Reg. Sept. 17. Capital £10,000 in £1 shares. Manufacturers, exporters, importers and dealers in cloth, wool, worsted, textiles, etc. Solicitors: Kenneth Brown, Baker, Essex House, Essex Street, W.C.2.

Eden Valley Fabrics (Freuchie) Ltd. Private. Reg. in Edinburgh on Sept. 1. Capital £10,000 in £1 shares. Spinners and manufacturers of jute, flax, hemp, cotton, ramie, wool or other fibres and textile fabrics, etc. Registered office: Eden Vale Works, Freuchie, Fife.

Herridge and Co. Ltd. Private. Reg. Sept. 3. Capital £10,000 in £1 shares. Exporters, importers and merchants of wool, worsted, cotton, silk and fabrics, etc. Registered office: 21 Forster Square, Bradford 1.

S. W. Goodchild and Son Ltd. Private. Reg. Sept. 3. Capital £2,000 in £1 shares. Textile merchants and agents, manufacturers and dealers in cloth, wool, etc. Registered office: 69-70 Mark Lane, E.C.3.

T.C.T. Ltd. Private. Reg. Sept. 4. Capital £2,000 in £1 shares. Letters on hire purchase, capitalists, financiers, credit traders, manufacturers, and dealers in textile fabrics of all kinds, tailors, etc. Cornelius W. T. Wade, of 12 Portugal Street, W.C.2, is the first director.

Guy Wolstenholme Ltd. Private. Reg. Sept. 3. Capital £10,000 in £1 shares. Manufacturers and dealers in woollen, worsted and cotton cloths, etc. Registered office: "Pengarth," Ashmount Road, Grange-over-Sands.

G. B. Textile Supply Co. (London) Ltd. Private. Reg. Sept. 4. Capital £1,000 in £1 shares. Manufacturers and dealers in textiles, etc. The directors are Leon Clarke and Mrs. Gisela Clarke, both of 1 Greencroft Gardens, N.W.8.

Segard and Co. (England) Ltd. Private. Reg. Sept. 11. Capital £50,000 in £1 shares. Wool merchants, top makers and waste dealers, etc. Registered office: 14 Piccadilly, Bradford.

Warwick Chemical (Yorkshire) Ltd. Private. Reg. Oct. 10. Capital £25,000 in £1 shares. Manufacturers, suppliers, and dealers in resin-forming formaldehyde and non-formaldehyde condensates for the treatment of textile materials.

Frank Cousen and Co. Ltd. Private. Reg. Oct. 7. Capital £5,000 in £1 shares. Manufacturers and dealers in wool, worsted, cotton, silk, etc. Registered Office: 2 Richard Street, Bradford 3.

Permacel Tapes Ltd. Private. Reg. Oct. 8. Capital £10,000 in £1 shares. Manufacturers and dealers in tapes of all kinds including pressure-sensitive and other kinds of adhesive and non-adhesive tapes, etc. Registered Office: 260/62 Bath Road, Slough, Bucks.

Fastnet Sales Ltd. Private. Reg. Oct. 10. Capital £1,000 in £1 shares. Textile and sailcloth manufacturers and merchants etc. Registered Office: 1 Harley Street, W.1.

P. L. (Yorks.) Ltd. Private. Reg. Sept. 30. Capital £30,000 in £1 shares. To acquire the business of dyers carried on by Tom Lees & Co. Ltd. Registered Office: 35 Westgate, Huddersfield.

Pudsey Worsted Mill Co. Ltd. Private. Reg. Sept. 30. Capital £3,000 in £1 shares. To acquire part of the undertaking of the Pudsey Worsted Mill Company Ltd. (in liquidation), etc. Registered Office: New Street Mills, Pudsey, Yorks.

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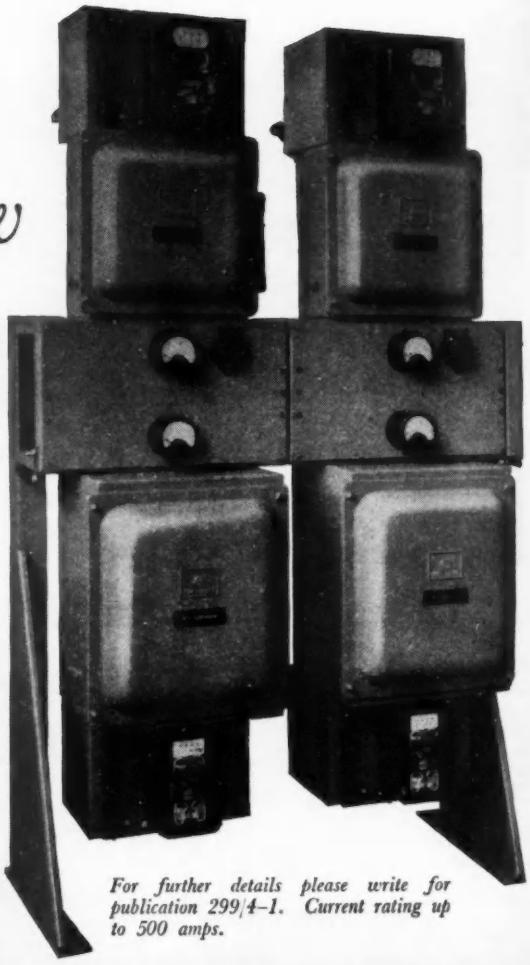

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RECENT TEXTILE PATENTS

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784,710 Non-Woven Fabric

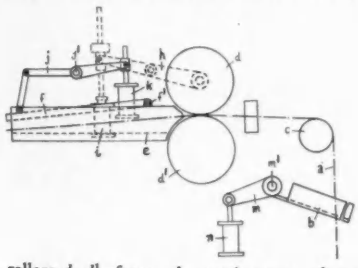
BRITISH COTTON INDUSTRY RESEARCH ASSOCIATION, *Shirley Institute, Didsbury, Manchester.*

Manufacture of a fabric resembling a woven fabric, consisting of sets of parallel threads in longitudinal and transverse arrangement but without interweaving. The threads in each set are in a separate layer and the integrity of the fabric depends upon the bonding together of superimposed layers, at their crossing points, and in such manner that the threads in each layer are free from each other. The warp-like threads are arranged on warp beams and passed through guides to take-off rollers and between the beams and take-off rollers, to dispose them in tubular form about a cylindrical former. This tubular arrangement of threads with their beams and take-off rollers is rotated and weft-like threads are fed from a stationary creel so as to be wrapped as a superimposed layer around the arrangement of warp threads while advancing the latter continuously along the cylindrical former. The warp and weft threads are bonded at their crossing points while on the cylindrical former. The fabric is slit continuously as it is produced by the bonding, and wound onto take-off rollers.

784,728 Adjustable Fabric Squeezing Rollers

SELLERS AND CO. (HUDDERSFIELD) LTD., *Engine Bridge Works, Chapel Hill, Huddersfield,* and E. R. SELLERS.

Improvements in B.P. No. 629,310, which described a machine for treating fabrics with liquids, wherein the weighting of the upper nip roller is effected by hydraulic means. The fabric *a*, is led up from the vessel through the draft board *b* and over the carrier roller *c* to the nip



rollers *d*, d^1, from whence it passes down the trough *e*, this being provided with a lid *f* pivoted at f^1. The top roller *d* is loaded by a lever *h* and pneumatic cylinder *i*, and the lid *f* is loaded by a lever *j* pivoted at j^1 and operated by a pneumatic cylinder *k*. The draft board is carried by a lever *m* pivoted at m^1 and connected to the rod of a piston working in a pneumatic cylinder *n*, thus enabling the draft board to be balanced against any desired pressure.

785,117 Composition for Roller Coverings, Drafting Aprons, etc.

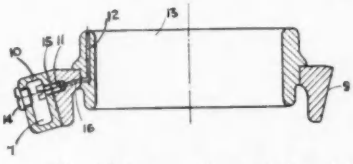
SILVERTOWN RUBBER CO. LTD., *Herga House, Vincent Square, London,* and W. H. MARTIN.

Relates to fibre-drafting elements used in connection with the manipulation of fibres of cotton, rayon, wool, glass, etc., such elements comprising roll cots, roll covers, draft aprons, etc. The fibre-drafting element composed of a vulcanised butadiene/acrylonitrile copolymer or polymerised chloroprene synthetic rubber is rendered water absorbent and hence less prone to the accumulation of electrostatic charges, by the addition to the rubber of one or more water insoluble hydrophilic inorganic materials, such as precipitated silicates and oxides and bentonite clay.

785,124 Oiling Spinning Rings

FAIRBAIRN LAWSON COMBE BARBOUR LTD., *Wellington Foundry, Leeds.*

An improved form of oiling system for the rings of spinning machines. Flat surfaces 9 are provided on both sides of the ring rail, and an oil channel 10 is fixed to one face, which consists of standard D-section extruded metal, running the length of the rail. The member has a hole 7 forming an oil channel, and is drilled through at each point at which a ring is to be served, and the member is fixed to the rail at each oiling point by a metering



screw 11. This screw has a hole which communicates via the hole 16 with the hole 12 in the ring 13, and the hole in the outer wall of the "D" section through which screw 11 is inserted is closed by a plug screw 14. An oil seal gasket 15 is inserted between the channel member and ring rail, and the plug 14 may also have a ring gasket or may be made of some plastic substance providing its own sealing effect. One of the screws 14 is replaced by a nipple or by a connection to an oil system. The meter jet may be provided with a filter and a non-return valve is required, to prevent dirty oil or water from running back into the oil channel.

785,232 Recovery of Waste Fibres

CHICOPEE MANUFACTURING CORPORATION, 501 *George Street, New Brunswick, New Jersey, U.S.A.*

A process for the removal of the copolymers of vinyl chloride and methyl acrylate (in which the proportion of vinyl chloride is at least 70% by weight) from cellulosic fibres, especially from trim and production rejects resulting from the manufacture of non-woven fabrics by applying the copolymer in emulsion form to a layer of card webs. This object is achieved by heating the fibres in a dilute caustic alkali solution containing a dissolved aliphatic ketone or alcohol at a temperature above the boiling point of the solution and for a period of not more than five hours. The presence of the dissolved alcohol or ketone in the treating solution markedly accelerates the removal of the copolymer from the cellulosic fibres.

785,770 Thread-tensioning Device for Twisting Spindles

BARMER MASCHINENFABRIK AKTIENGESELLSCHAFT, *Wuppertal-Oberbarmen, Germany.*

A twisting spindle has a thread run-in section with an inlet hole, and a tensioning device which is mounted in the section eccentrically of the hole and includes a disc which is caused by the travel of thread through the device to rotate with respect to another disc. A permanent magnet acts on the device to urge the discs together and is spaced from it by removable spacers. Regulation of the tension is made possible by the spacers which are removable so that they can be changed at will.

786,173 Weft Cutting Device for Looms

W. V. GLEDHILL, *Ty Bryn, Holmfirth, Huddersfield.*

A weft grabber for a weft replenishing loom has a two edged fixed jaw, one edge of which co-operates with a pivoted clamping lever, and the other edge co-operates with a cutter associated with the clamping lever. The cutter is preferably arranged on the opposite face of the grabber to the clamping lever and in addition to holding the weft thread taut for the temple thread cutter, the grabber also severs the thread at the side of the grabber nearest to the shuttle. The piece of thread between the grabber and the shuttle eye falls away and cannot be dragged into the fell of the cloth by a shuttle.

786,257 Motors for Winding Frames

COMPTOIR DE L'INDUSTRIE COTONNIERE, *Etablissements Boussac,* 19 and 21 *rue Poissonniere, Paris, France.*

Improved means for the control of electric motors driving winding machines, comprises, in combination, a direct current motor with series connected field windings, a dynamo for feeding the motor and having three independent field windings, i.e. a separately fed winding, a first connected winding, a second series connected winding and regulating means. The fluxes created by the three windings are varied individually, so that the motor is controlled in accordance with the resultant field of the dynamo.

F/A 709

786,354 Lofty Nylon Yarn

BRITISH NYLON SPINNERS LTD., *Pontypool.*

A new process for producing a lofty synthetic linear polymer yarn, which depends on the intermittent separation of short lengths of individual filaments from the main strand of a multifilament yarn, the separated filaments being looped, curled or convoluted to project from the main strand. The separation and looping of the filaments is brought about by applying to a running multifilament yarn of low twist, a shearing stress, by passing the yarn between two surfaces which bear resiliently upon them and are in motion in the direction of the axis of the yarn.

786,444 Waterproofing Fabrics

A. J. DICKINSON LTD., *Neptune Chemical Works, Canal Approach, Deptford, London.*

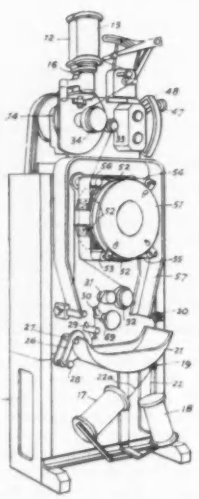
A process for waterproofing fabrics, in which the fabric is impregnated with a water-proofing composition comprising 3,5,5-trimethyl hexanol-1 esters of titanic and/or zirconic acids, which composition is hydrolysed in situ in the fabric.

In one example, a bath consisting of 280 lbs. composition No. 4 as described and 1,720 lbs. white spirit was prepared by gentle heating, and suitable loads of dry-cleaned garments (woollen and cotton raincoats) were well impregnated with the solution by normal commercial procedures. After hydroextracting, the garments were dried and steam-pressed. All the garments exhibited a high degree of water repellency combined with soft handle and freedom from "sweal" marks. (Composition 4: 100 lbs. paraffin wax (m.pt.135°F.); 25 lbs. refined petroleum jelly; 15 lbs. butyl acetyl ricinoleate; 80 lbs. tetra-nonyl titanate; 30 lbs. tetra-chlorethylene.)

786,482 Sizing and Polishing Yarns

W. AYRTON AND CO. LTD., *Gorebrook Ironworks, Longsight, Manchester,* and F. OSBORNE.

Relates to the sizing and polishing of yarns, particularly sewing threads in which size is applied to the yarn and then the yarn is presented continuously to a rotary brush. The yarn is arranged over guides so as to form a closed polygonal

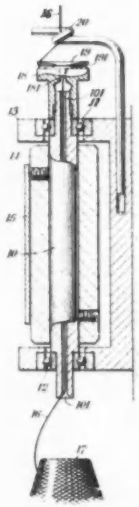


geometric figure around the brush for at least one complete convolution and so that a number of spans of yarn between the guides makes contact with the brush. In addition the feed-back is prevented at least between consecutive convolutions, of yarn tension due to frictional contact with the brush. The illustration is a front view of one example of a high speed thread sizing and polishing machine made in accordance with the invention.

786,580 False Twister

T.M.M. (RESEARCH) LTD., *Hartford Works, Oldham.*

A twisting unit comprises a hollow spindle 10, mounted in ballbearings 11, 12, and supported by a bracket 13. The spindle has a driving wharve 14 rotated at high speed by a belt 15. The spindle has a central passage 101 through which the thread 16 is fed from a package 17. At the top of the spindle and arranged to rotate with it is a head 18 having a passage 181 and on its upper face two semi-circular projections 19 which are on opposite sides

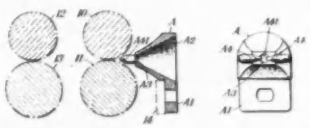


of the exit aperture of passage 181. The outer surface 191 of each projection is grooved so that thread travelling through the passage 101 and issuing from passage 181 may be passed in an approximately figure-of-eight fashion about the projections. A lappet-guide 20 is spaced above the head 18, by which the thread is guided to a re-winding unit (not shown).

786,528 Roving Condensers

T.M.M. (RESEARCH) LTD., *Hartford Works, Oldham.*

A guide for a drafting system comprises a body having a through passage of diminishing cross-section leading to a circular-section orifice and two opposed cheeks one on either side of the orifice



and having convex surfaces which engage the side of a roving emerging from the orifice in such manner as to control the fibres to a point close to that at which they are grasped between the next following drafting rollers or aprons.

786,531 Weft-Inserting Devices for Looms

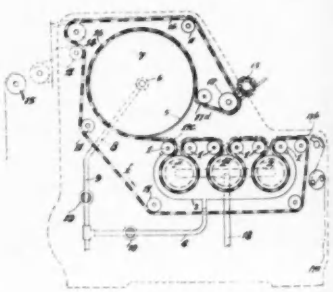
R. DEWAS, 120 *Boulevard Saint-Quentin, Amiens (Somme), France.*

A weft inserting device comprising a pulling needle having a springy clamp and a guard that not only protects the warp threads, but, at the same time controls the end of the shoot when it is released from the elastic clamp. The upper edge of the guard is so shaped that, from its point beyond the end of the elastic clamp there is a succession of distinct zones. A first horizontal zone, corresponds to the least height of the guard to prevent the warp threads being caught up by the ends of the branches of the elastic clamp during the forward run of the needle through the shed as well as during the backward run, at the moment when the clamp and its guard begin to leave the shed and allow the selvedge warp threads of the upper sheet to come into contact with the upper surface of the springy branch of the clamp. A second zone is inclined to form an intermediate plane between the first zone and the upper edge of the guard at its greatest height to allow of the passage of the warp threads of the upper sheet from one level to another, both when the needle is entering and leaving the shed. A third zone, links the second zone to a wider part forming an upper right angled flange on the guard, reaching its greatest width at a point immediately in front of the tip of the hook of the springy branch to prevent the catching up of the selvedge threads by the hook, whilst the clamp is leaving the shed.

786,833 Apparatus for Decatizing Fabrics

G. SPEROTTO, 7 *Ca Masotta, Schio (Vicenza), Italy.*

Describes an improved apparatus for decatizing fabrics. 2, 2′, 2″ denote three decatizing cylinders of the series and 1 denotes seven rollers associated with these cylinders. The cylinders and rollers are mounted in a container 3 connected to a vacuum pipe 4. 5 is a drum enclosing a chamber 7, the wall of the drum being provided with holes and the circular end walls being solid, one or both of these end walls having a central aperture 6. This aperture allows the interior of the drum,



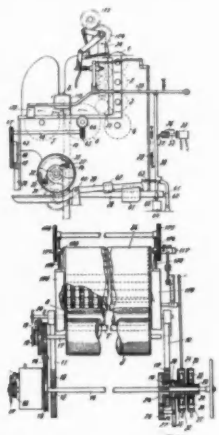
to communicate with a vacuum pipe 8, 9. 11 denotes guide rolls, 12 is a cylinder which delivers the fabric to a rolling-up device 13, and 15 is a cylinder which may alternatively deliver the fabric to the folding device. 16 is an endless belt which travels in the direction of the arrow *f* in a continuous movement, the band being wrapped over the decatizing cylinders, the

conditioning drum, and the guide and ancillary cylinders, 11, 14. 10 denotes a throttling device controlling the pipes 8, 4, 9 and 18 is a pipe which supplies steam into the decatizing cylinders. In carrying the method into effect, the fabric is fed in from position 17*a* and entrained at 17*b* on to the various decatizing cylinders. The fabric leaves the decatizing cylinders and the associated chamber and passes at 17*c* over the conditioning drum, along the outer walls of which the fabric is subjected to the action of ambient air passing through the belt 16 and the wall of the drum which dries the fabric. At 17*d* the fabric passes at 12 either on to the rolling-up device 13, or is conveyed by the belt 16 over the roller 14 on to the roller 15, the latter delivering it on to a known folding device.

786,852 Automatic Lap Former

KANEGAFUCHI BOSEKI KABUSHIKI KAISHA, 1612, 2-*chrome, Sumidamachi, Sumida-Ku, Tokyo, Japan.*

An automatic continuous lap forming machine comprises a series of calender rollers, a pair of lap-forming rollers, a lap roller which is rotated by contact with the lap-forming rollers and upon which is wound fibre continuously fed through the calender rollers. A press roller is positioned in contact with the lap, and positively rotated at a surface speed equal to that of



the lap-forming rollers. A pair of bars rotatably support the press roller and have racks meshing with gears secured on a brake shaft. A brake drum is mounted on the brake shaft, with a brake lever for engagement with the drum, and means to release the lever from engagement with the drum instantly when a predetermined length of fibre is wound upon the lap roller.

786,855 High Speed Laying of Tow into Containers

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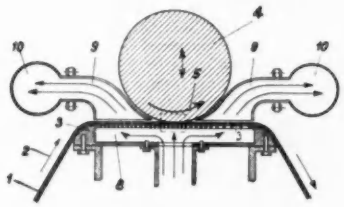
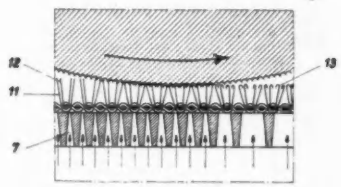
Apparatus for laying a tow into a container which is particularly suited for use when the tow is moving at such a high speed that a stream of air would cause fluffing of the tow. The tow is fed on to an advancing reel having a smaller diameter at the discharge end than at the feed end, the reel carrying the loops of tow to the discharge end by means of outer portions of a number of radially projecting wheels which rotate and move the loops of tow along the reel so that the loops of tow are thrown off into the stationary container.

786,921 Apparatus for making Hooked Pile Fabric

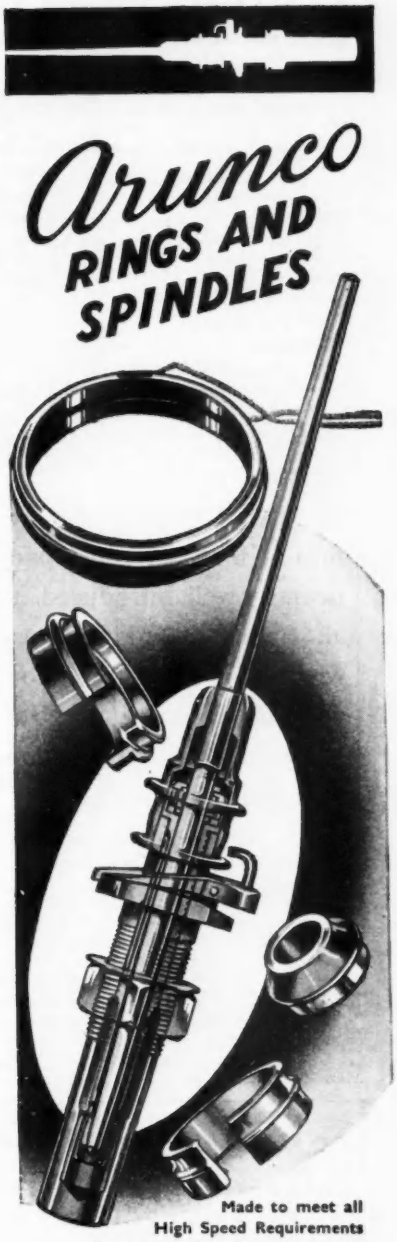
K. FORSTER, *Beethovenstrasse* 1, *Munich* 15, *Germany.*

Apparatus for producing fabrics which can adhere to each other by inter-engaging very small fibre hooks. A pile fabric 1, in which the pile threads are already cut, is pulled at a constant speed in direction of arrow 2 over a slideway 3, whereby the pile is on that face of the fabric which is not on the slide-way. Above the slide-way, a roller 4 is arranged in such a way that the distance of the roller, surface from the support is adjustable, and the roller is driven in direction of arrow 5 at a speed corresponding to the speed at which the fabric is passed over the slide-way. The surface of the roller is honey-combed by semispherical or ellipsoidal concave facets which have a diameter corresponding to the diameter of the hooks to be formed, for instance about 0·25 mm. The roller is heated and maintained at a predetermined temperature by means of a thermostat. The slide-way provided with cooling means for the foundation fabric and the lower portion of the upright pile threads. If air cooling is used, the slide-way may contain slots 7, through which cooling air passes from the space 8 against the lower face of the fabric. The cooled air, which is admitted under pressure, passes through the porous foundation of the fabric and is sucked off by means of aspirators 10 through the funnels 9. The production of the hooks is as follows. The fabric, with projecting upright pile threads 11, is drawn below roller 4 on the





slide-way, and the tips 12 of the threads strike against the facets 6 and are plasticized by the contact with the hot surface of the roller. The lower ends of the threads retain their rigidity and elasticity because they are cooled by the air forced through the slots 7. On further passage between roller and slide-way, the threads are subjected to axial pressure, whereby the tips are bent conforming to the shape of the facets 6, and form hooks. As soon as the web has passed below the lowest surface line of the roller the deforming procedure is terminated. As the tips have been plasticized by the heat, the shape of the hooks is retained. Towards the exit side of the apparatus, the cooling slots 7 are enlarged, so that the cooling effect extends now to the bent hooks 13 and sets the same in their hooked shape.



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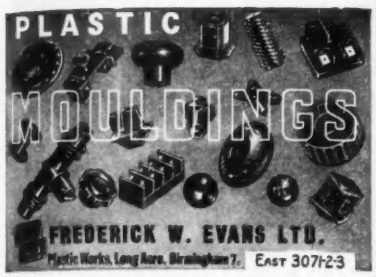

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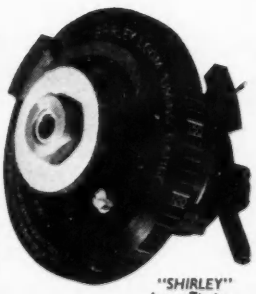

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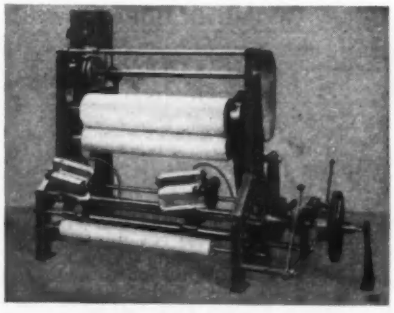

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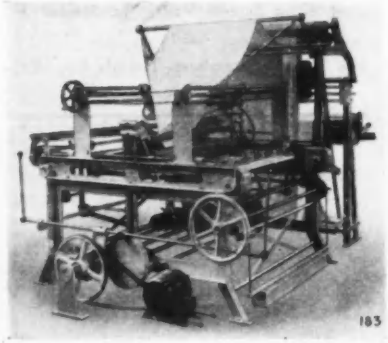

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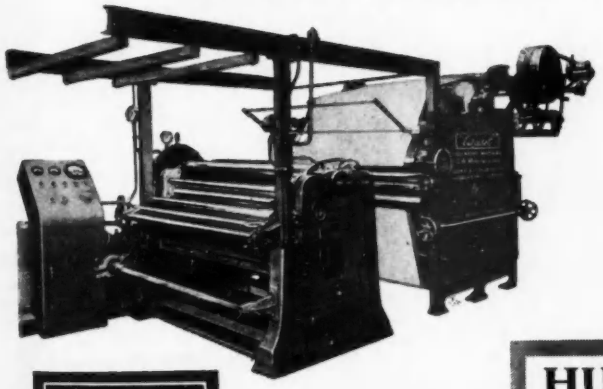

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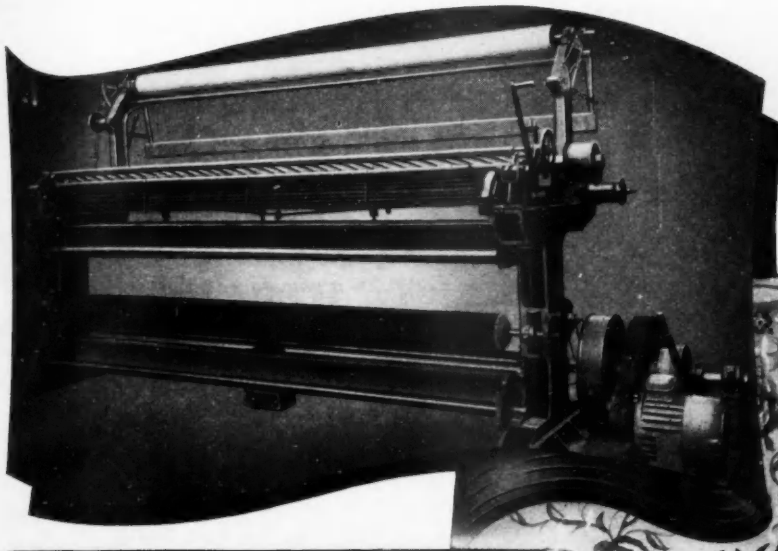

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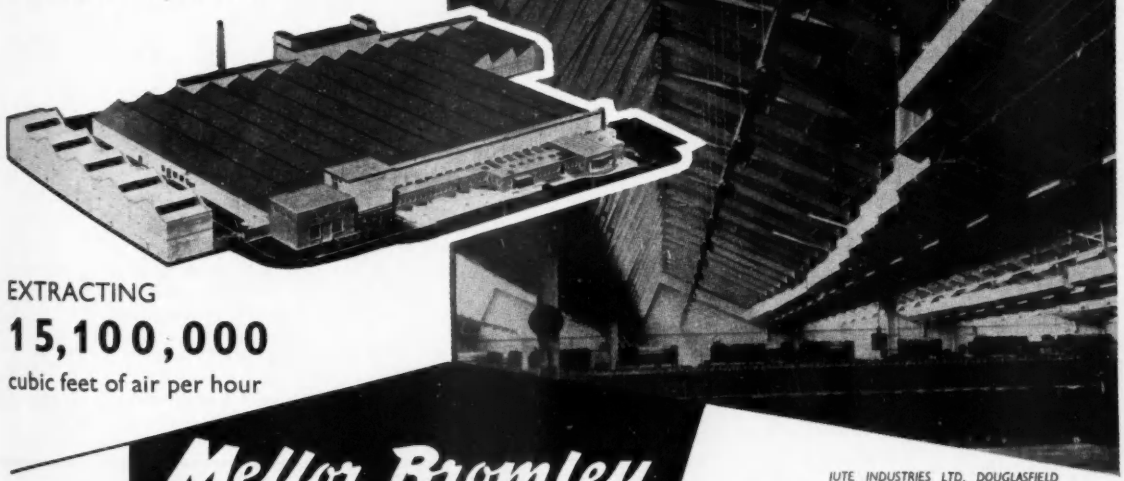

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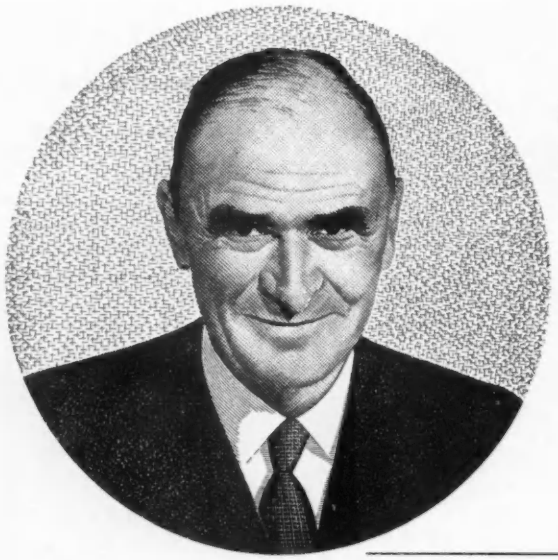

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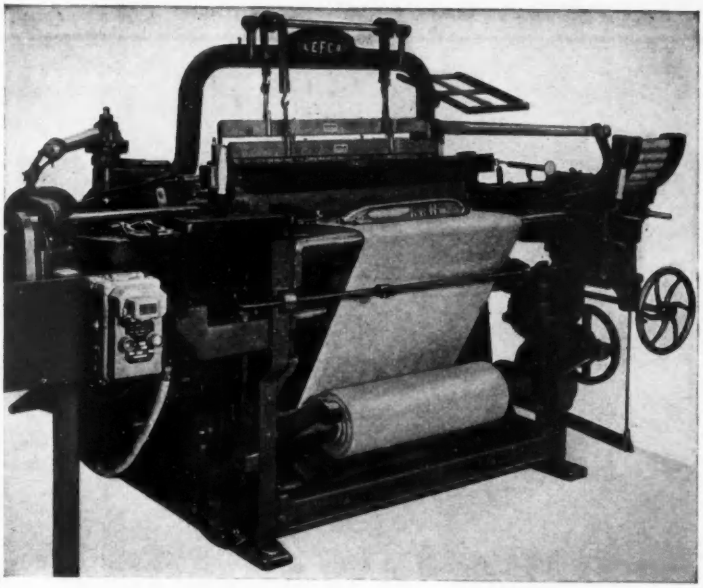

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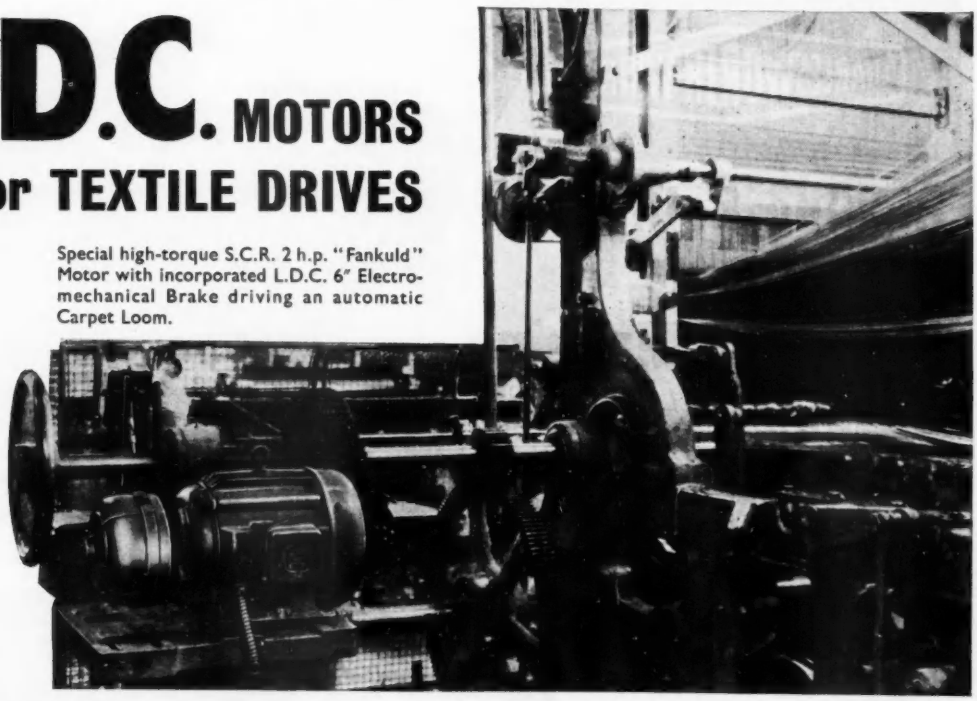

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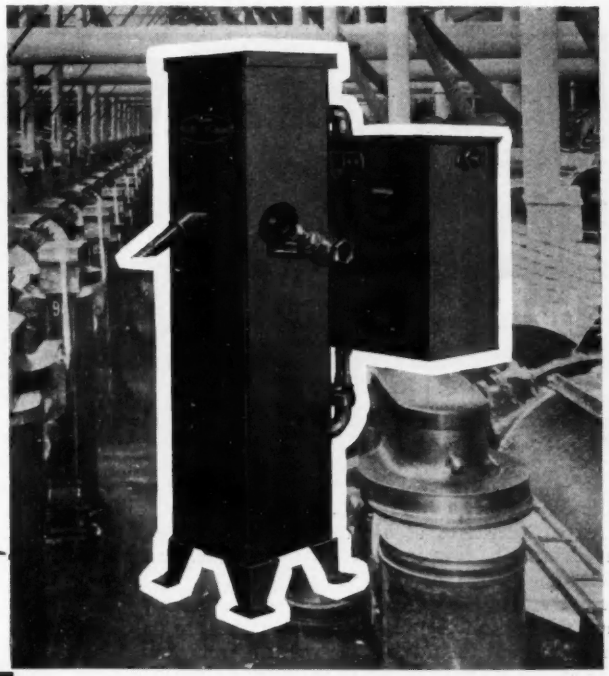

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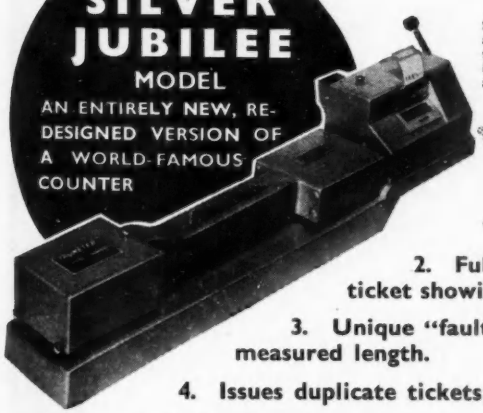

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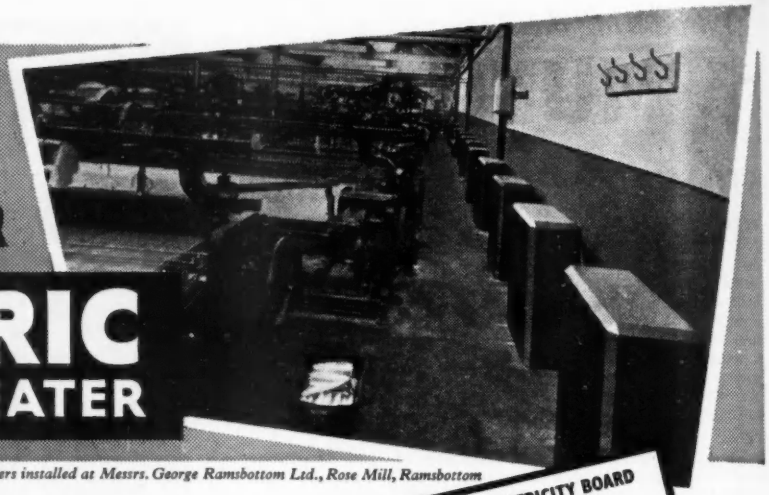

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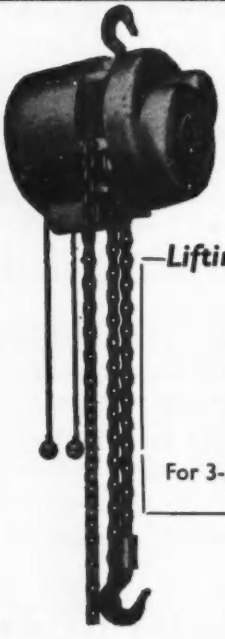

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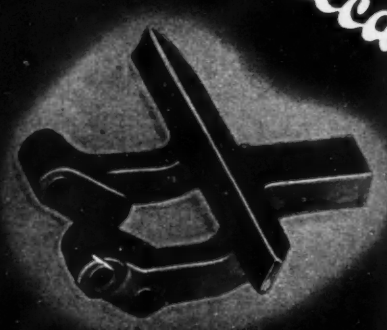

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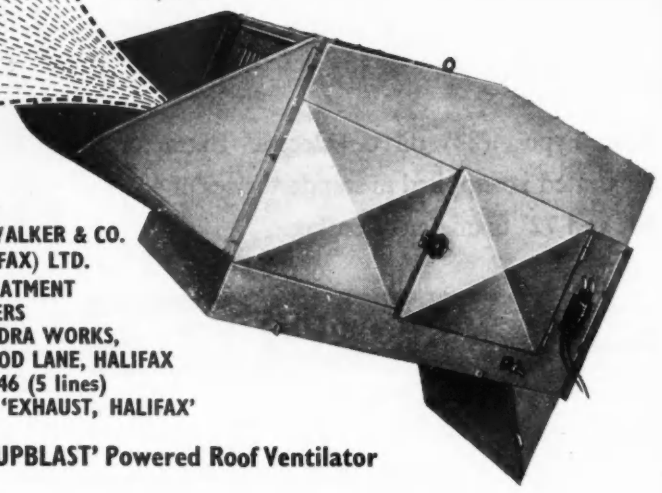

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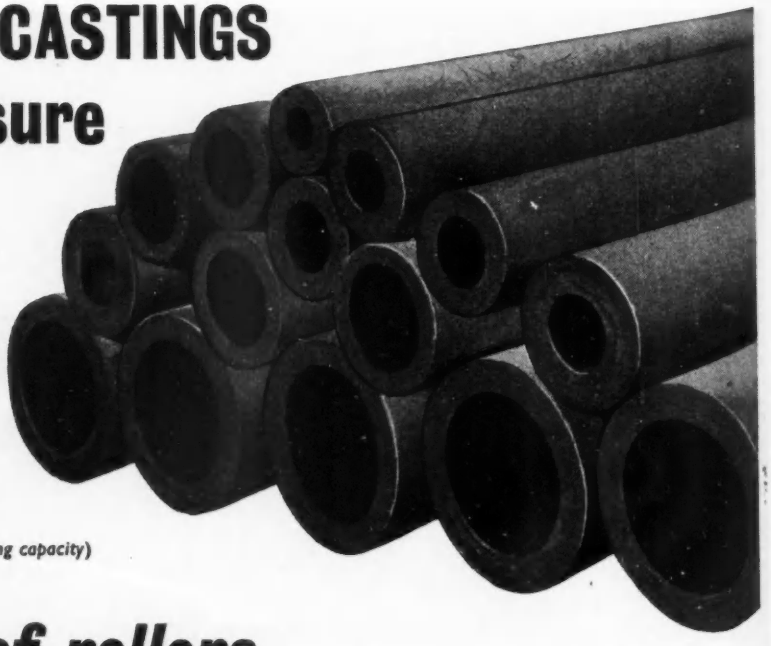

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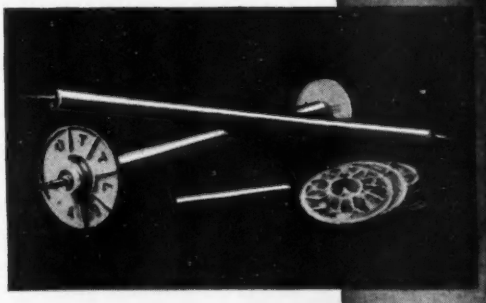

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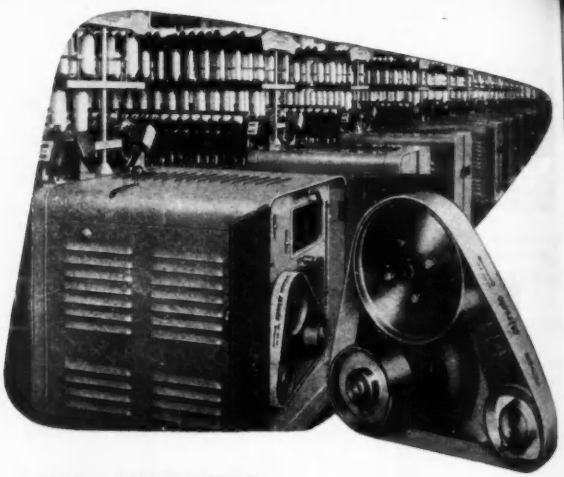

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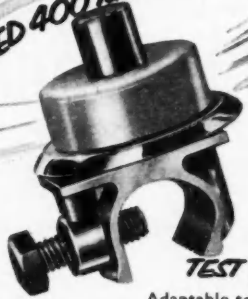

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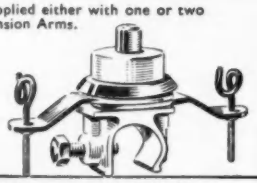

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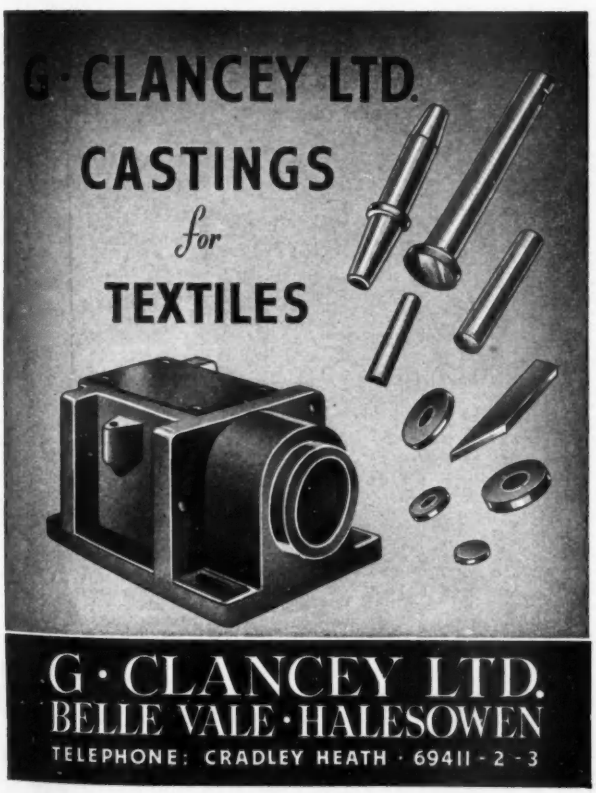

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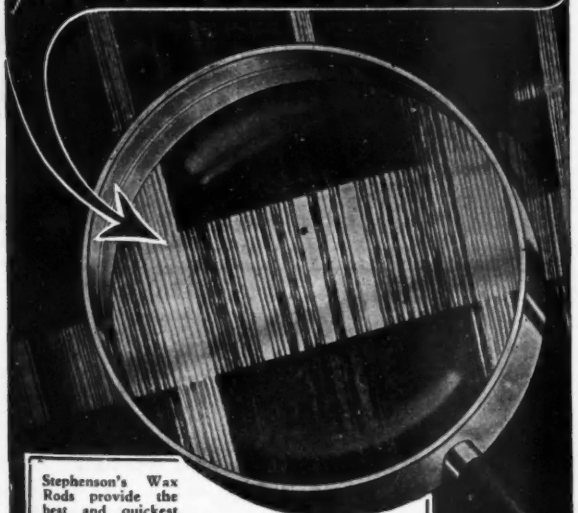

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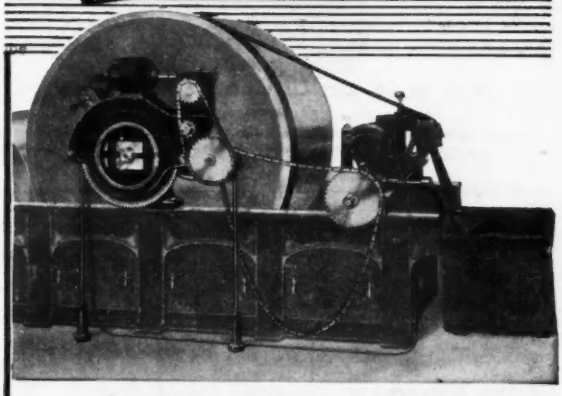

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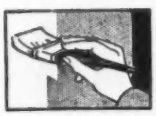

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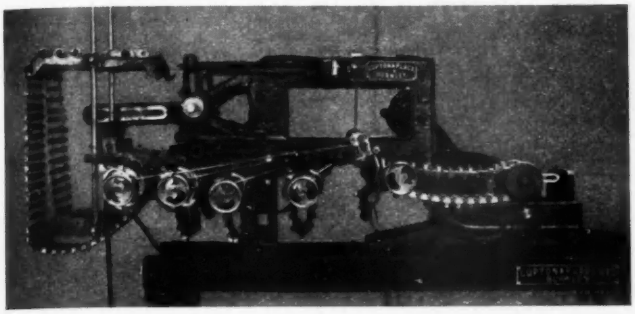

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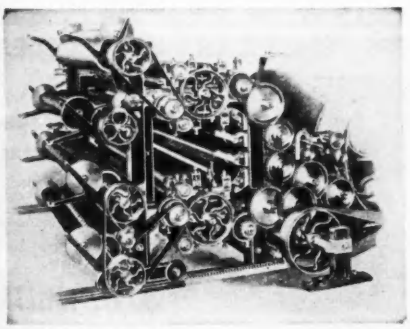

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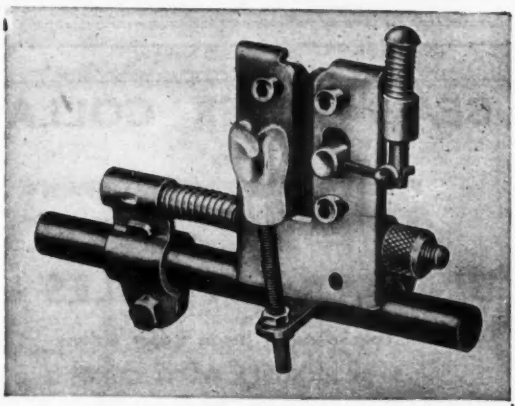

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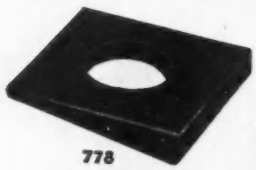

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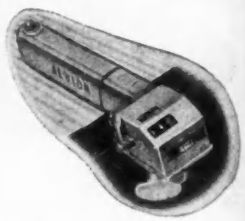

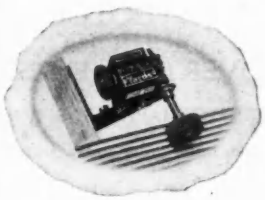

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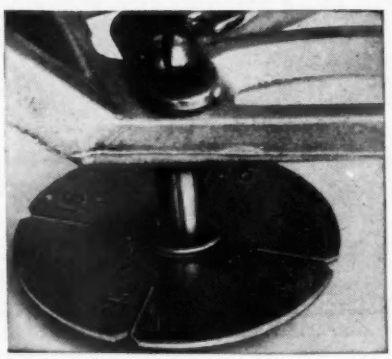

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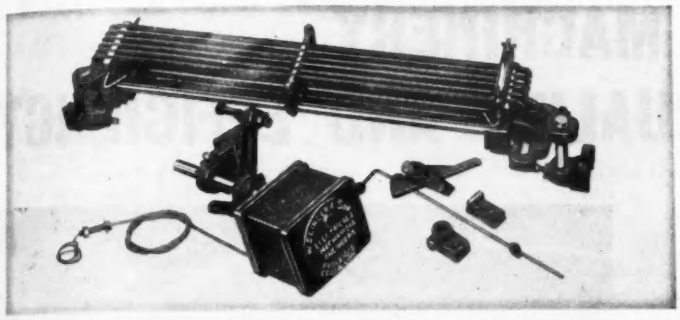

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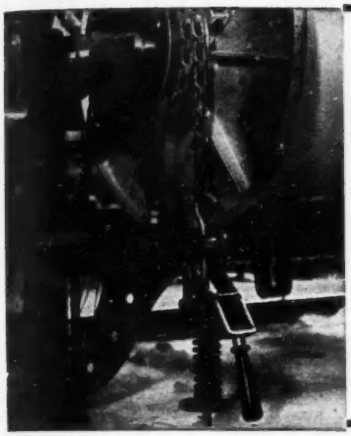

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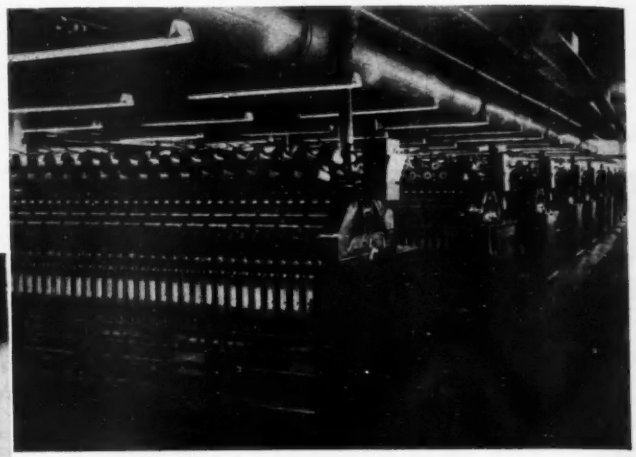

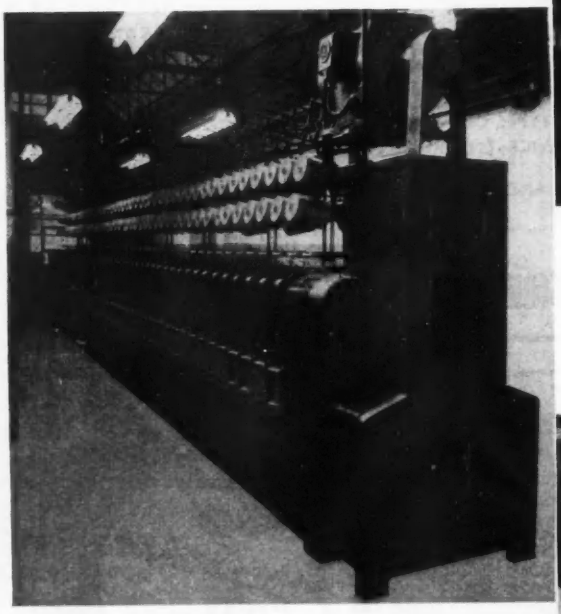

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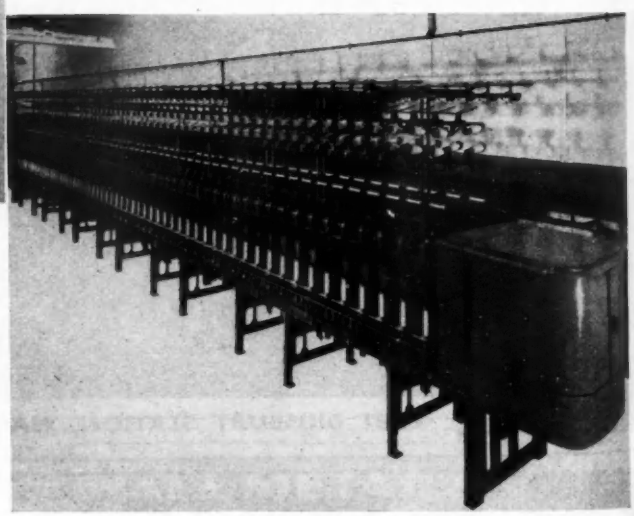

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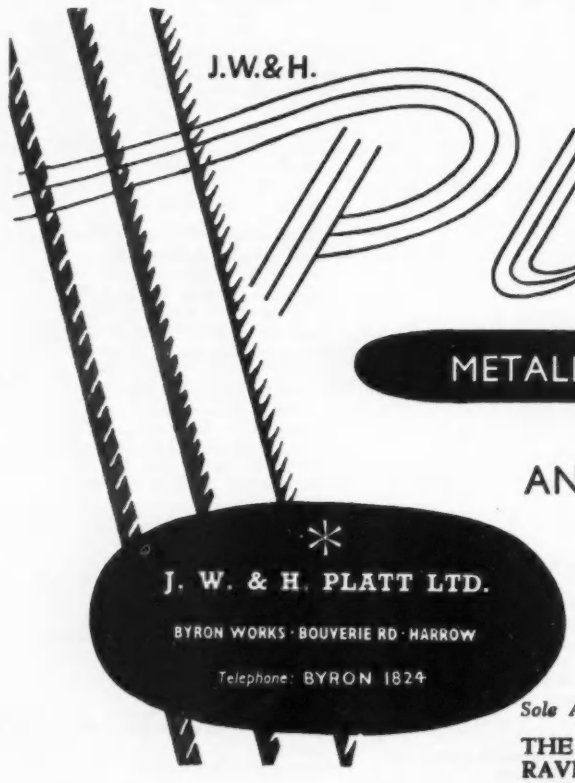

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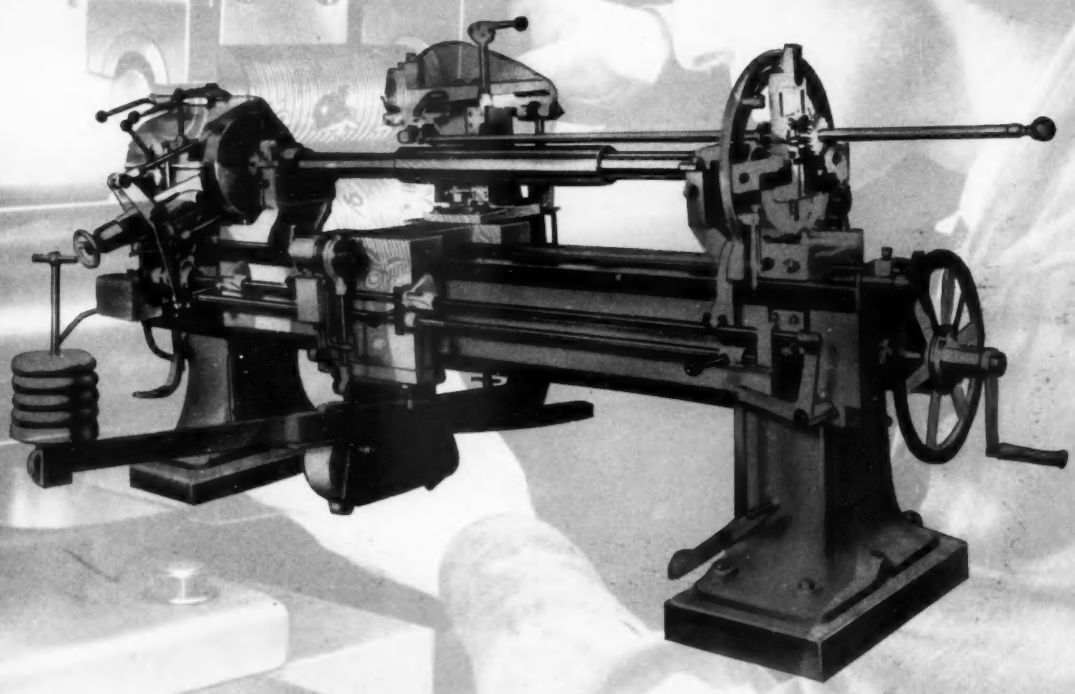

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